MOTOR AGE

CHILTON PUBLICATION

VOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

JANUARY
1938

IN THIS ISSUE

Short Cuts on Overdrives
An up-to-the-minute article that will save you time and headaches when servicing these units.

Servicing the 1938 Chevrolet Clutch
You will want to keep this story at hand for quick reference.

The Low-Down on Overhead
The methods one man has used to lick this bug-a-boo.

Hal Roe Writes
A letter to Motor Age readers from the man whose problems you've all been interested in.

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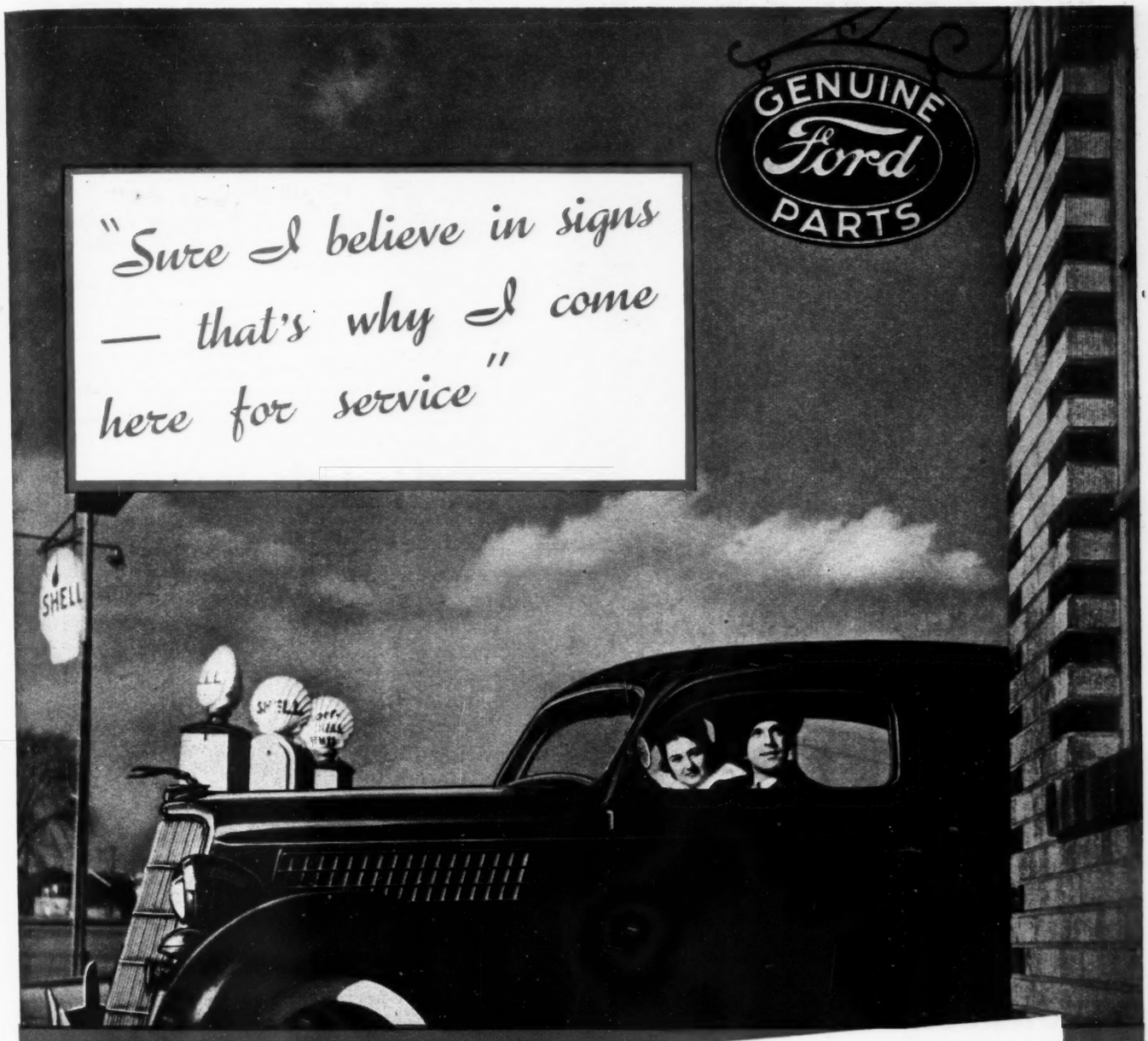

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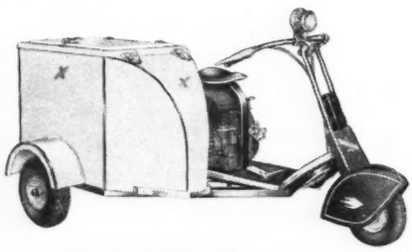

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MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

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SHOP TALK

On Your Toes

Let's get on our toes and away to a flying start for 1938. There's lots of money to be made in maintenance, so let's make this a record year. There is plenty of dope in each issue of MOTOR AGE which, if applied to each individual repair shop, will give the competition plenty to worry about. If you have any particular problems let me know and perhaps we can work out the answer together.

Cleary vs. Toboldt

Well, the ink hadn't gotten dry on the December issue before John Cleary, who edited MOTOR AGE when it was a weekly, dashed into the office and informed me that my quotation on page 17 from Dickens' Christmas Carol was all wet. By the time he was through panning me, there was a regular line-up at the office door of editors, stenographers, clerks, and typists all dancing in glee and gloating over the fact that they could hang something on my eye. Well, that has been done by experts, so I survived. However, I don't think that as an ex-mechanic I did so bad with the quotation. I said "God bless everyone of us" and the correct quotation is "God bless us everyone."

Which reminds me of some of my dear (?) relations and how they raised their eyebrows when I first got this job of editing, and how they remarked, "I really don't see how William can make a success of that job. You know he always failed in English when he went to school!"

Sore Dogs

But let's turn to more important things. The Automotive Service Industries show is now a thing of the past, thank God, and I'm back at the desk to answer all the accumulated correspondence. That was a great show and the Navy Pier in Chicago is at least one-half mile long and by the time I shuffled up and down the aisles a couple of times, my feet sure were dragging.

The ASI show, as you know, is for automotive jobbers and, in talking to a lot of the manufacturers, they agreed that the jobbers seemed in a buying mood. They didn't know anything about a depression, which was reflected in lots of sales. There were lots of new parts, equipment, accessories and supplies displayed, most of which were described in the December issue of MOTOR AGE. In some instances, however, the manufacturers didn't want to release the dope on their new products until after the show. Consequently, such products will have to be held over for another issue.

De Paolo Writes Again

I had a nice session with Pete DePaolo at the Four Georges in the Sherman Hotel. In addition to winning the Indianapolis Race in 1925 (incidentally being the first one to raise the record above 100 m.p.h.), Pete is quite a writer. His book, "Wall Smackers," is to me the most interesting book ever written on racing and he is now working on another book. Pete agreed to write a story on the Indianapolis race for me. It should be pretty hot, because, first of all, Pete surely knows his stuff and, secondly, there will be plenty to write about as the new race specifications go into effect with the next race.

(Continued on next page)

SHOP TALK

Continued from page 17

More Racing

Speaking of racing, did you all read the story by Ab Jenkins in collaboration with Elliot Curtis, editor of *Automobile Trade Journal*, in the Dec. 4 issue of the *Saturday Evening Post?* Elliot also took the colored pictures for the story. A great job.

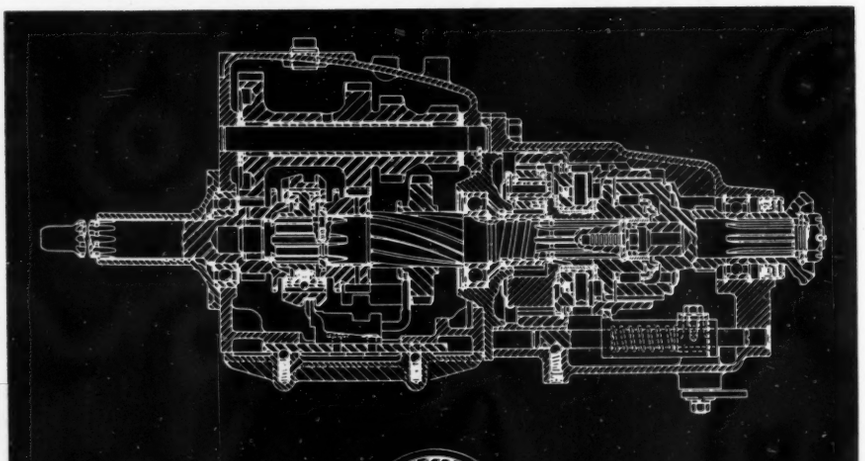
Roe Licks Trouble

I know a lot of readers will be interested in learning that Hal Roe, up in Duluth, has finally licked the trouble on his Studebaker. Last week he wrote to me and said that he finally got the job revving up so that the speedometer showed 100 m.p.h. It is particularly interesting because, of all the letters that I received, not one of them guessed the trouble and my diagnosis was as far off as any. The trouble was carburetion, just wasn't getting enough gas to do the job. But you can read all the details as I have reproduced his letter in full in this issue.

Ferguson's Headache

Carl Ferguson, in Wilmington, Del., who was getting more speed out of a Packard with burned points than with new ones, still has his headache. He says he talked it over with Joe Parkins of Philadelphia and Joe thinks that when the points burn into each other a longer period of build-up occurs, boosting the voltage above normal and also advancing the spark some. Carl says that that theory seems to check pretty well with what he has found, but can't understand why no one else has run into similar trouble. Just in case you are interested, Carl's original letter, describing his trouble, appeared in the September issue.

Bill Toboldt



Short Cuts

Here is an up-to-the minute article you will want to keep handy, just in case you have any work to do on these new units.

The illustration above shows sectional views of the assembled overdrive transmission. At the right, the unit is disassembled and the illustration shows the relationship between the different parts.

On Overdrives

A LOT of time can be wasted when disassembling the overdrive transmission as used on the Studebaker Commander and President 1938 models if the correct procedure is not followed. The best "short cut" method is as follows:

First, unscrew the shift lever cap and remove the transmission shift lever assembly. Then take off the transmission case side cover assembly, together with the shifting bars. The next step is to take off the universal joint nut and flange, which requires a puller.

The overdrive housing is secured to the transmission housing by means of cap screws. These should next be removed and then the speedometer pinion bushing. Then, hold the shaft in the forward position and remove the overdrive housing. The shifter case and shifting fork assembly will remain in the housing.

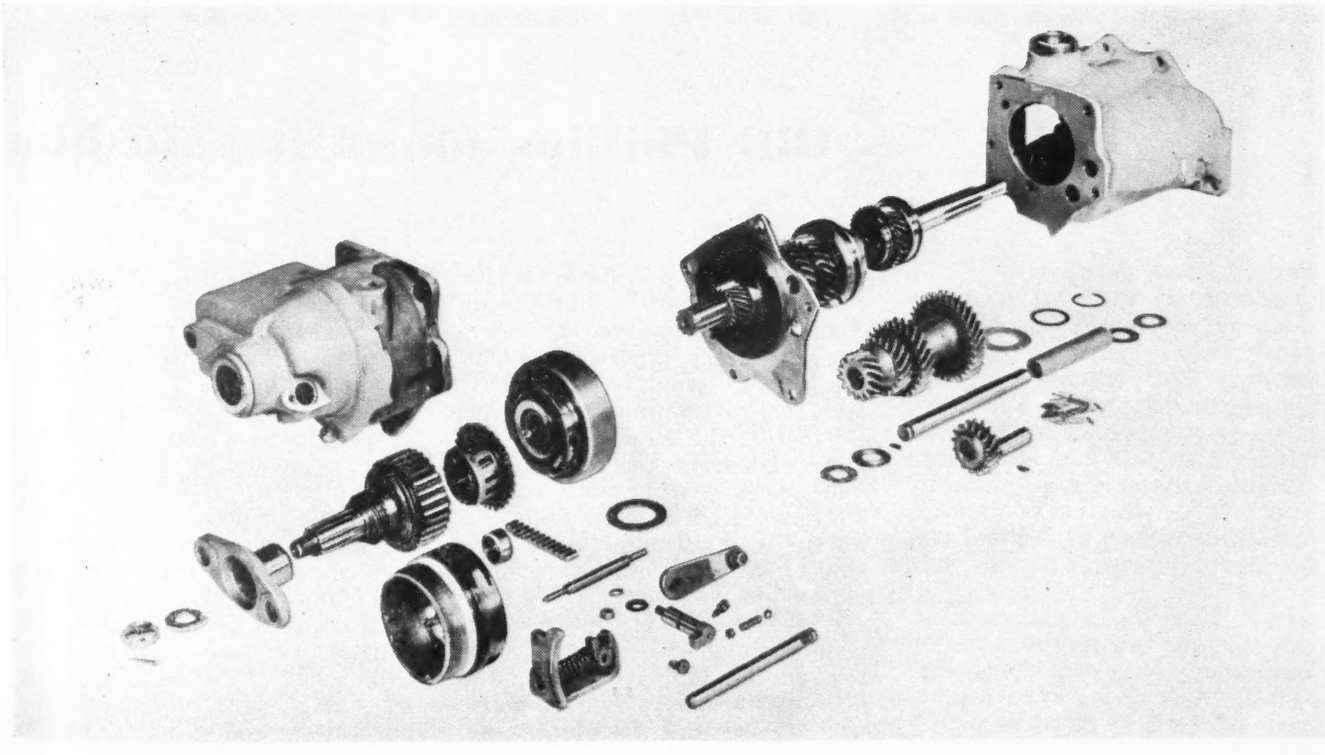
Remove the overdrive unit rear shaft, taking care not to lose any of the free-wheeling rollers, which are free to drop from place. Next remove the free-wheeling hub retaining screw and also the bushing at the center of the hub. This will permit pulling off the overdrive pawls, ring gear and pinion assembly. Tap the sun gear retainer plate rearward until ¼ in. clearance is obtained between the transmission rear face and the inner edge of the sun gear retainer plate. To remove the sun gear retainer plate and the main shaft assembly a dummy shaft is required. With the dummy shaft start the countershaft rearward until the Woodruff key between the sun gear retainer plate and the rear face of the transmission case is exposed. Using a long, thin-bladed screwdriver, force the key out of the countershaft. Then push the dummy shaft through the countershaft needle bearings, following the countershaft rearward so that the front end of the countershaft is in the rear bore of the transmission case, the dummy shaft will extend entirely through the countershaft gears and the four thrust washers. Push the countershaft rearward through a hole in the sun gear retainer plate, which registers with the countershaft location if the plate is not allowed to turn.

Then push the countershaft gear assembly to the bottom of the case, which will then permit the removal of the sun gear retainer plate and the mainshaft assembly, through the rear of the case.

Then pull off the synchronizer unit. This should be wrapped in clean rags to protect it from dirt. Push the hub out of the synchronizer ring gear to release the poppet balls and springs. Keep these in a separate container or wrap in rags. Next, with a knife blade, depress the constant mesh stationary gear lock plunger and rotate the retaining ring so that the ring splines register with the mainshaft grooves. This will permit the removal of the retaining ring by sliding it toward the front and also the removal of the stationary gear and bushing.

Remove the sun gear locking ring and tap the sun gear out of the retainer plate, using a soft drift. Three screws hold the pinion front flange to the transmission case, which should be removed so that the pinion front flange can be pulled from the transmission case. Next remove the lock ring around the pin-

(Continued on page 49)



Keeping overhead down by cleaning up. This picture was snapped without advance notice. Note clean condition of floor, walls and tools.

Phillips uses the advertising helps supplied by manufacturers to good advantage. This is a night view of one of his show windows.

He Has the Low-down

Bill Phillips found it paid him

WHEN we asked the service manager of a large car agency in a prosperous Pittsburgh suburb where we could find an automotive shop that was really stepping out and doing things he said, "Go to the main corner in Castle Shannon and see a young chap named Philips. He's a good fellow, a hustler and turns out first class work. We send him everything we have to send out."

This news was interesting. usually such work gravitates toward the big city shops, but here was a case of where work was leaving the city limits and going to a small town. We figured there must be an interesting reason for this so we drove out to Castle Shannon and parked alongside the Philips Co.

This fellow Philips, we discovered, was a young chap, but what he lacked in years he more than made up in enthusiasm for work and pride in his little business. He was almost eager to talk about what he'd done, and his plans for the future.

"I started from scratch just a little over two years ago," he explained. "I'd been working in a big shop on commission but things got so bad I had to

Bill Phillips helps keep overhead down doing plenty of work himself.

by
JACK BEATER

on Overhead

to be afraid of it

quit. They should have been getting plenty of business, but they weren't. It was a case of mismanagement. There were plenty of cars on the road but they were staying away from this shop in droves. Now I don't claim to be smart but I felt sure I could do better for myself than I could by staying with this firm. Even if I didn't know what the right way to run a business was, I'd seen enough to know the wrong way. So I quit.

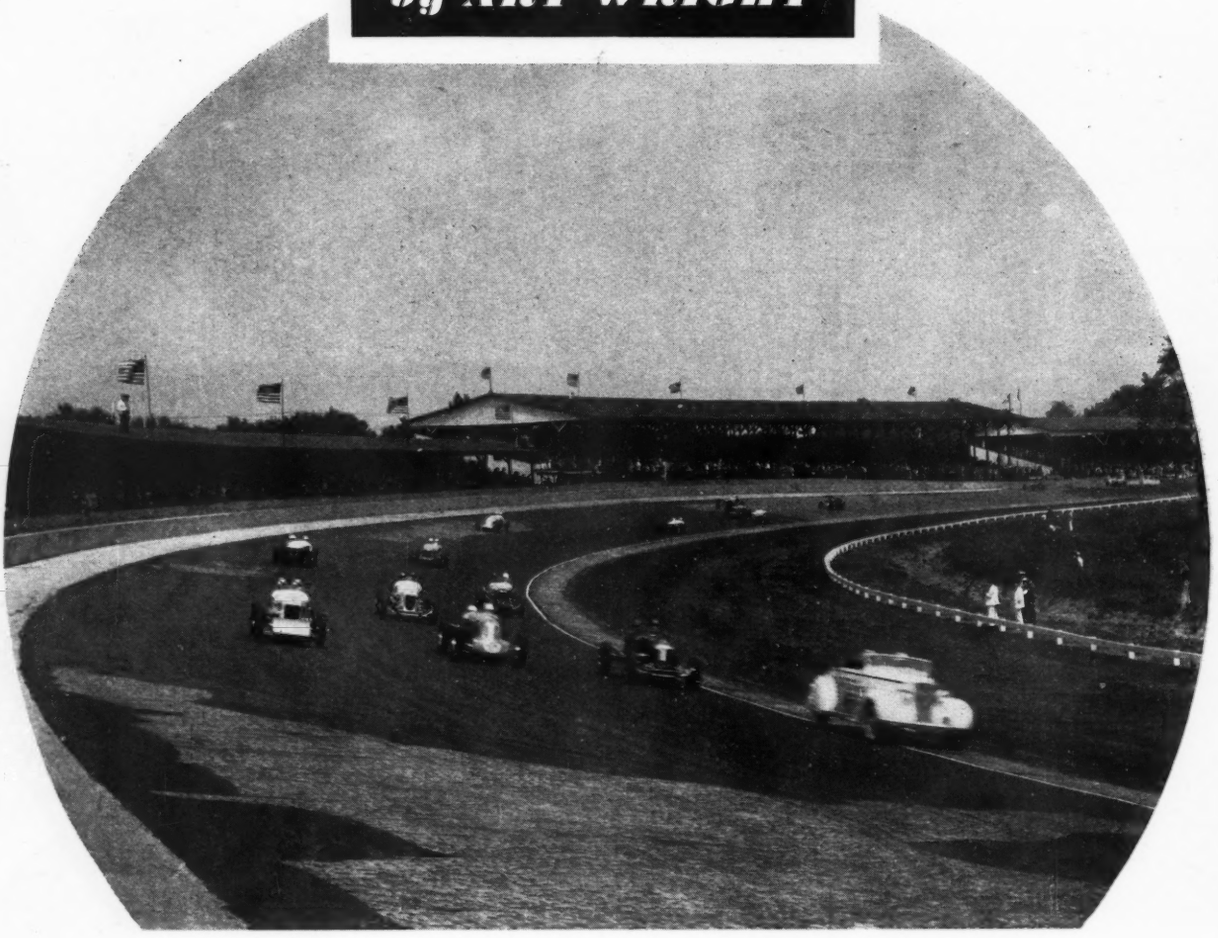
"I had a grand total of $80 to start in business for myself, so I looked around until I found this location. It's rather far out from town, but on $80 you can't start up on Automobile Row. Besides, I figured my chances would be better in a smaller place. I used the $80—every cent of it—to make the down payment on the first month's rent, a lathe, and undercutter and test bench, and to buy outright three rental batteries, a few battery cables and have the phone connected.

"People didn't rush around to bring me business. I hadn't expected they would. I knew I'd soon have a bunch of payments on the equipment coming due, so I went out and solicited business by personal contact. I called on car dealers, garages and car owners alike. It brought results and proved what I'd been thinking all along—that there's always business to be had if you honestly go after it. Enough came in through these calls in the first few months to give me a living and make all the payments as they came due.

"I've got good credit established now and discount all my bills in 10 days. I discovered it sure pays to do this. I fig-

(Continued on page 50)

by ART WRIGHT



When The Green Flag Drops

—The 1938 Racing Season Will Start With The New International Rules

AUTOMOBILE racing is currently having its "face lifted." Throughout the United States—and in Europe—speed drivers and their mechanics are studying blue-prints conforming to the new set of rules ordered for the 1938 season.

As a result of the International Formula adopted by the International Sports Commission thousands of dollars worth of expensive racing equipment will go into the "melting pot" and thousands more will be spent on the necessary revisions.

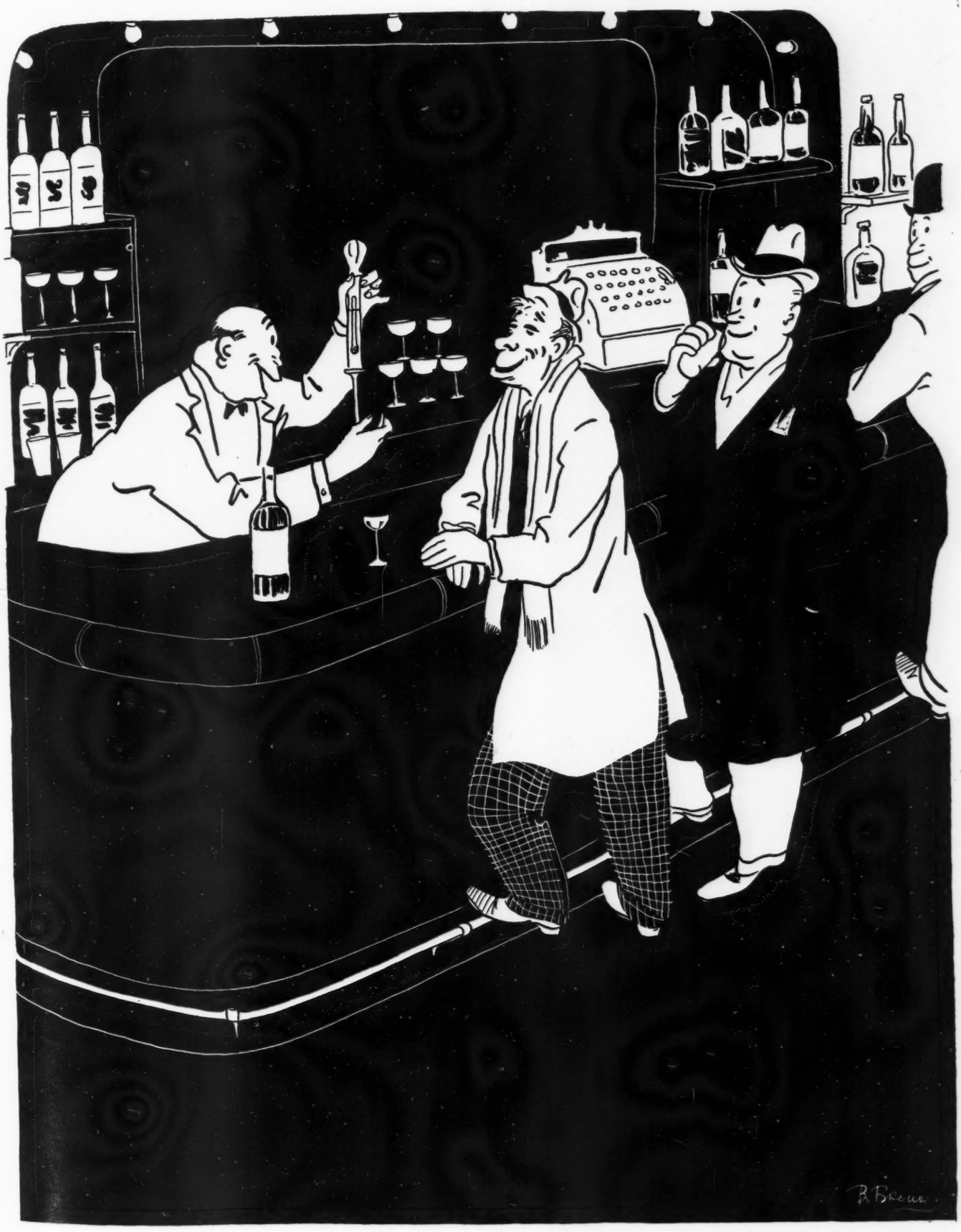
At America's Indianapolis Speedway and Roosevelt Raceway, and at Europe's major tracks, a different—and some say, faster—car will thrill racing's fandom. And most important, is the unity of design. The rules provide international regulations for which car manufacturers have been campaigning many years.

It has rightfully been the complaint, particularly by American race car manufacturers and owners, that separate cars were necessary to success at both Indianapolis and at the new Roosevelt Raceway.

Now that the new formula brings all rules into one bracket, this nation's racing fraternity is hastening plans for new cars to compete with the European creations which have blocked American victories in the two Vanderbilt Cup races so far run at Roosevelt Raceway.

Details of the American cars being prepared for the new season, which at this time is scheduled for opening at Indianapolis on May 30, are not available at this early date. While work on new cars is known to be under way at Indianapolis,

(*Continued on page* 38)



"You can go home now—you're good for 10° below zero!"

Servicing Chevrolet

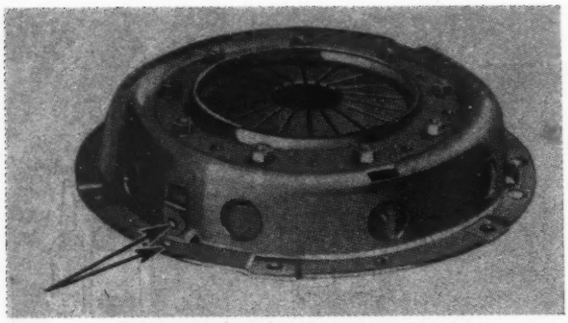


Fig. 1. Production balance marks on clutch cover and pressure plate.

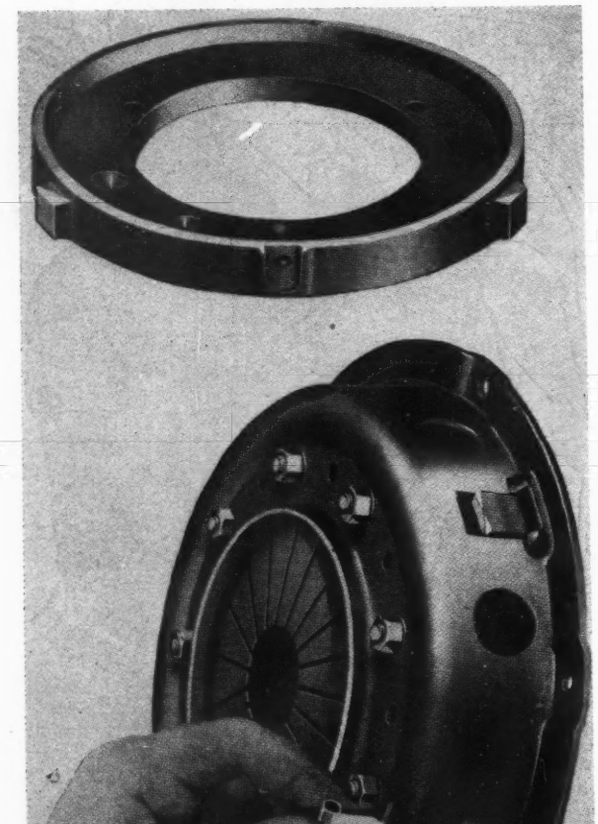


Fig. 2. Removing clutch retracting spring.

Fig. 3. Removing clutch cover bolts.

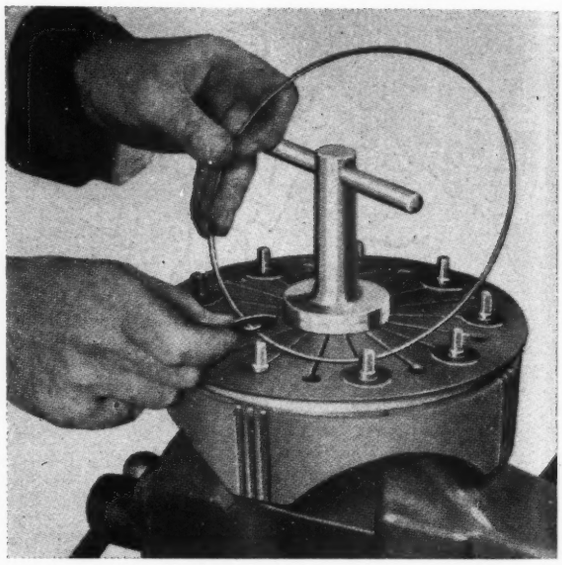


Fig. 7. Installing upper pivot ring and washers.

THE 1938 Chevrolet uses a clutch which is a distinct departure from conventional design. This new clutch is designed around a diaphragm spring which has the shape of a dished washer with 18 tapering fingers pointing inward. When the clutch is engaged, these fingers are flat while the rim of the diaphragm spring bears against the pressure plate. Pressure of the throwout bearing on the inner ends of the fingers causes a diaphragm action, the outer ends of the fingers near the rim pivoting on the foremost of two fulcrums provided by two rings, one on each side of the spring. This action causes the rim of the spring and the pressure plate to move away from the clutch disk, thus disengaging the clutch. When the clutch pedal is released and the throwout bearing no longer contacts the fingers, the "spring" of the diaphragm causes the fingers to pivot about the rear fulcrum ring and the rim to bear against the pressure plate. The entire action is much like the diaphragm action of the bottom of an ordinary oil can.

The removal of the 1938 clutch assembly from the engine is the same as on former models, except that the torque tube must be supported while the universal joint is being uncoupled. This is necessary because of the new rear spring seat mounting. The clutch throwout fork may be removed from the housing without removing the transmission. It is, of course, necessary to remove the transmission from the

The 1938 Clutch

BY HARRY ROBERTS

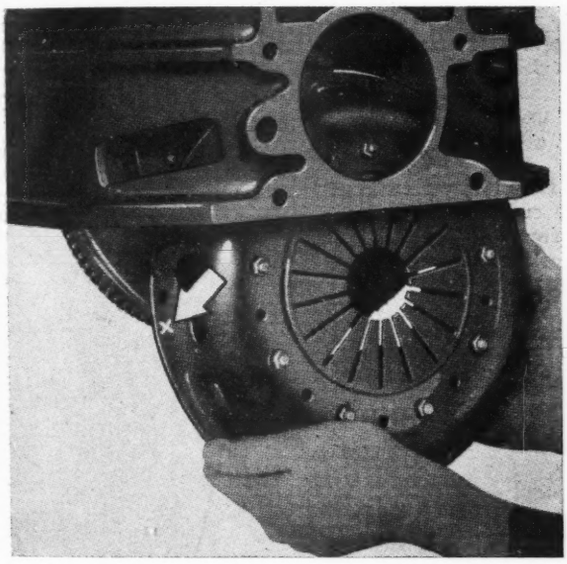


Fig. 8. Installing clutch assembly on flywheel.

chassis in order to remove the clutch throwout bearing.

To remove the clutch assembly from the engine, a special pilot tool should be placed in the clutch housing to support the clutch assembly as the six clutch cover to flywheel bolts are being removed. These bolts should be loosened one turn at a time until the spring pressure has been removed. This should be done carefully to avoid distortion of the clutch cover.

Fig. 1 shows how a zero (0) mark is placed on one lug of the pressure plate and also on the flange of the clutch cover adjacent to the pressure plate lug guide. In reassembling the clutch, it is important to have these marks in the same relative position to avoid an unbalanced condition.

The pressure plate is held in the clutch assembly by three retractor springs. These may be removed by removing the bolts as shown in Fig. 2, after which the pressure plate will slide from the assembly.

In order to avoid distortion of the clutch diaphragm spring or cover, it is necessary to compress the diaphragm spring to a flat position and relieve the spring pressure from the cover bolts, before removing the nuts and lock washers from the bolts. Fig. 3 shows how the diaphragm should be compressed, using a special fixture, while removing the nuts from the cover bolts.

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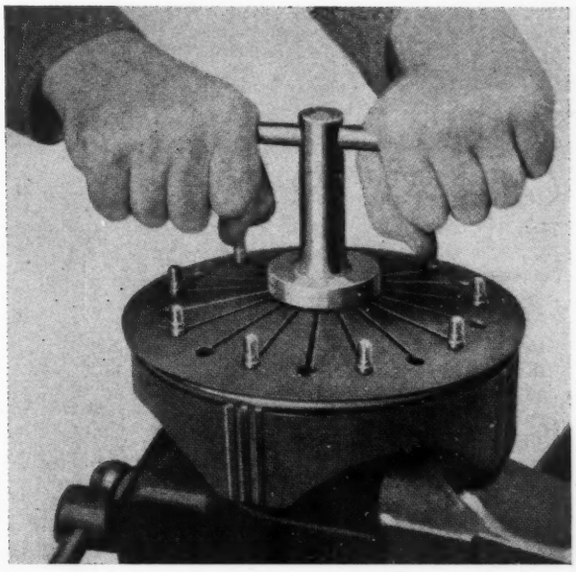


Fig. 4. Compressing diaphragm spring.

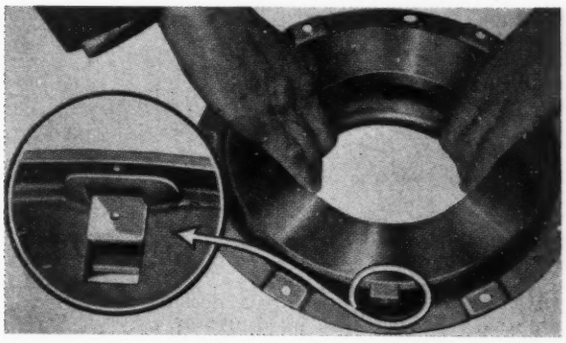


Fig. 5. Checking clutch pressure plate drive lug fit.

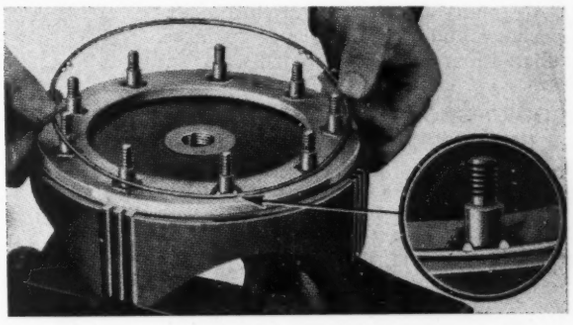


Fig. 6. Installing lower pivot ring over bolts.

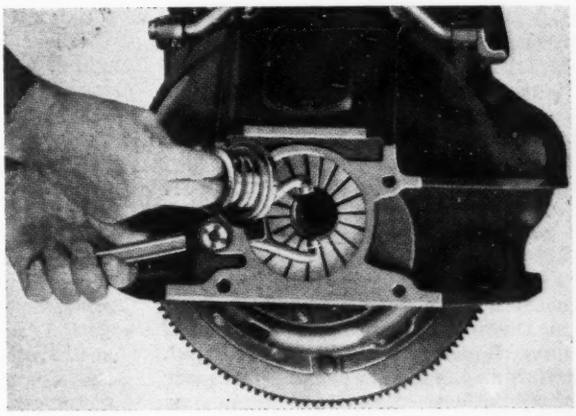


Fig. 9. Installing clutch throwout fork and bearing.

SELLINGS

Pick A Card

COOK'S BROADWAY AUTO SERVICE, in Portland, Ore., is a repair shop that believes a little printing on a little card can mean a lot in the way of extra business. Whenever a car is left at Cook's a service man gives it a once-over, checking air filter, crankcase, transmission and differential lubricants, battery charge, battery cable condition, oil filter, brakes, wheel alignment, lights, fan belt, tires and spark plugs. The results of this examination are marked on a card which is placed on the instrument panel. Work badly needed is marked on a section of the card over which the word "Danger" is printed in large red letters.

Cook's fondness for cards doesn't stop there. They also make use of a return-mail postal card as a follow-up a few days after the customer has been in. Cook's part of the card lists their many service facilities and experience and asks for future business. The return part of the card says:

COOK'S BROADWAY AUTO SERVICE EXPRESSES APPRECIATION—

for the privilege of servicing your automobile, which was in our Service Station a few days ago.

We never cease in an attempt to improve our service, but information is essential to our progress. Our own customers are best able to give us the facts which we need, and that's why we ask you to favor us by filling out this card. If you will be kind enough to do so, it will assist us in giving the type of service which will meet with your approval

NO POSTAGE REQUIRED

Were employees prompt, courteous?..
.....
Was service entire satisfactory? ....
.....
Remarks or suggestions .....
.....
.....
(Sign name, if you wish)

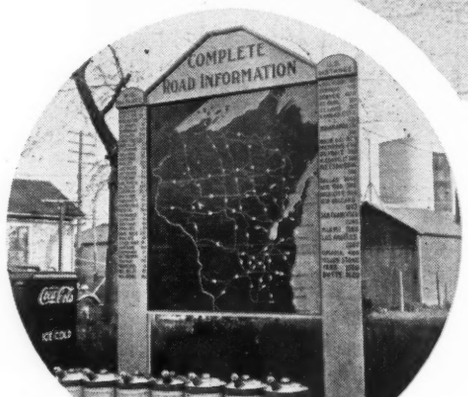
Cook's report that they have had many a useful service suggestion sent to them via these cards. Even if nary a good suggestion was received, we think the idea is worth much more than the cost of the cards simply as a fine good will builder.

Lest They Forget

WHEN we were told that the Commercial Tire Company, a Seattle service spot, was using a tow-cycle in calling for and delivering customers' cars we weren't overexcited, for it's not exactly a new idea. However, we did prick up our ears when we heard what a swell job they've done with that service in bringing in extra profits.

Seems that they don't believe in sending a grease-covered youngster around to a customer's home when the phone rings for their free call-for and delivery service. Instead, they send a smartly uniformed service salesman (shown at right) who knows service work.

His appearance and his familiarity with service work lead the customer, who may have called only for a wash job, to respect his suggestions regarding other work that might be done at the same time. Such suggestions are too often ignored when the garage representative is just an animated grease spot with about as much real service knowledge as the said grease spot.



The service salesman's efforts are greatly aided by a card which he hands the customer. With the heading "Lest You Forget," the card lists a number of service items which act as a reminder to the motorist of the things on his car that might need attention. The customer may say no to the salesman's suggestions when he calls for the car but, when looking the card over after the attendant has gone, he is often reminded of a forgotten squeaky brake, a persistent rattle, etc. Then the phone rings at the Commercial Tire Company—announcing additional business—extra profits.

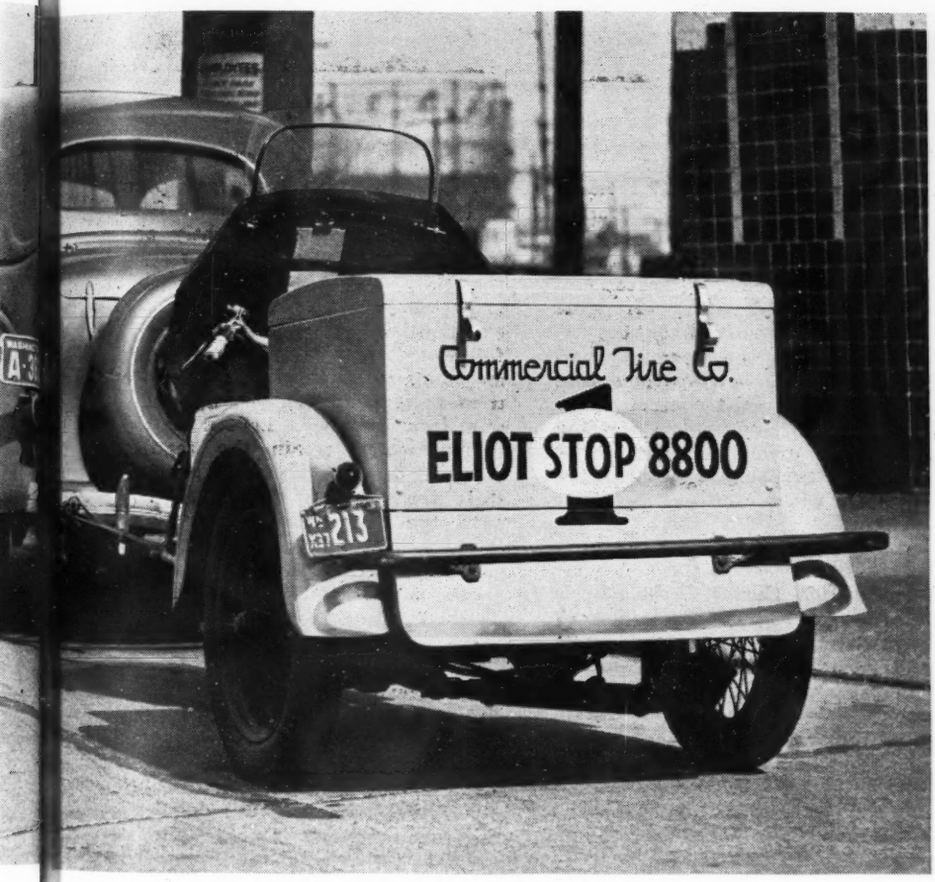
Stopper Sign

JACK ALBERTS, who hails from Oconomowoc, Wis., is a newcomer to the ranks of automobile repairmen. Until recently he won his bread and butter by operating a gasoline service station, then he decided to take advantage of the profit possibilities in expanding his services to include repair work. He erected a $7,500 building and installed an array of equipment that makes his location outstanding in that section of the country.

Jack is always on the lookout for methods of increasing his profits and

SERVICE

By BERT POLLOCK



has discovered, as have many other repair men, that his lubrication department is a gold mine when it comes to selling customers on additional work. Some of the customers who have come in just for a lubrication have been sold as much as $50 worth of extra work or equipment.

Oconomowoc numbers five thousand people as permanent residents and plays host to a great many tourists throughout the year. Jack Alberts made sure he would get his share of the tourist trade by erecting a special tourist map sign. This sign cost over $75 and contains, as its central feature, a map of Wisconsin. On both sides of the sign are the names of the principal vacation spots of Wisconsin and also the principal cities in the United States. The distances to every city are shown.

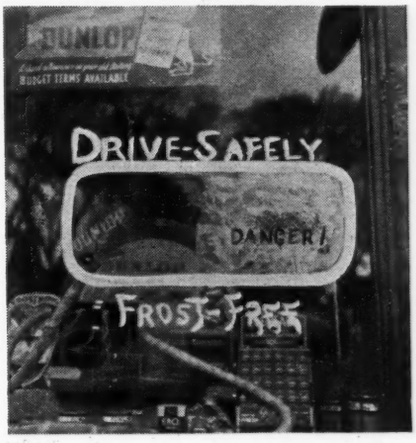
Jack keeps the sign well enameled and varnished the year around and has found it to be a sure "stopper" for the passing motorists.

Selling Display

WISCONSIN is also the home state of the Dunlop Tire Co. which hangs out its shingle in Beaver Dam. They believe in attracting the attention of the passing motorists and, to this end, created a novel window display.

F. E. Brown, Dunlop Tire Co. manager, and R. C. Hollnagel, his assistant, went to work and set up the display. It features a painted windshield on the display window with one half of the windshield given a frosted effect with white paint and the other half remaining clear. The copy "Drive Safely—Frost Free" was painted above and below the display, while the word "Danger" was lettered into the frosted area to call attention to this feature.

A heater and defroster arrangement was hooked up to the display from a storage battery, with small streamers of paper set in motion by the air being blown against the windshield.



A good idea? We think so—and so does Mr. Brown who says he can trace ten sales to it in the first week it was displayed.

Talking, Moving Display

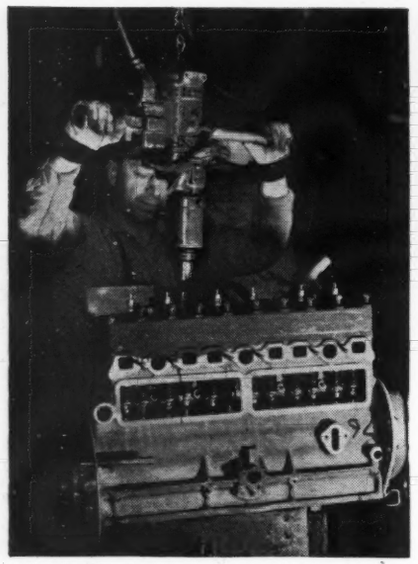
THE Dunlop Tire Co. isn't the only place interested in display. We heard recently of a repair man who used himself as a sort of animated display for drawing business to his shop.

This fellow's garage was located at a street intersection passed by many motorists hurrying to work each morning. A police sign at the intersection directed cars to stop before crossing—thus, each car paused a moment before his garage.

Our repair man, whose business was slow in the early morning, conceived the idea of standing on the corner. As each car drew up he'd wave his hand and holler, "Good Morning!" At first he felt pretty silly about the whole thing for a lot of the motorists didn't realize he was speaking to them, and they'd look right through him without any sign of recognition. Little by little, though, they began to return his greeting each day and, when cross traffic was heavy, would have time to chat a moment or two about the weather and whatnot.

His was certainly an inexpensive display, yet it brought him a lot of extra business. Motorists began to look forward to his friendly greeting each morning and eventually more and more of them started coming to his shop with their business, just because they felt they knew him.

We like the idea and recommend it for you to follow provided that, should there be a blonde in one of the passing cars, you can restrain that impulse to shout, "Hi, Toots!" instead of, "Good Morning."



Service Hints

From the Factories

Installing Cadillac Wheel Bearings

When installing the rear wheel bearings on the axle shaft of La Salle 37-50 and Cadillac 60 cars, the bearing must be correctly located. On cars of later production, the bearing is installed flush against the locating shoulder. On a few of the first cars produced, however, the axle shaft does not have a shoulder and the bearing must be driven on the shaft just far enough to allow 5/32 in. between the bearing and the inner edge of the hub. All axle shafts supplied by the Parts Div. for service use are of the latter type with a locating shoulder for the bearing.

Olds Misses

Missing at high speed on Oldsmobile is sometimes due to gum and corrosion on the three steel balls used as a bearing for the spark advance plate in the distributor.

Chevrolet Economy Engine

When a regular 1937 Chevrolet engine is changed into an economy engine the performance and speed of the vehicle is curtailed to obtain lower operating costs. To change the 1937 production engine to an economy engine, the following parts should be installed: Part No. 595852 Fleet car adjusting instruction plate; Part No. 476061 Fleet car identification plate. Part No. 596366 Anti-freeze caution tag. Part No. 111872 Oval head rivet. Part No. 595849 Manifold cover. Part No. 985128 Thermostat assembly. Part No. 595959 Carburetor assembly. Part No. 838341 Water outlet gasket.

Permanent anti-freeze must be used when anti-freeze is used in the cooling system. Inlet tappets should be adjusted to .010 and the exhaust to .016 in. with the engine hot. Transmission should be filled with S.A.E. 40 motor oil and the engine with not heavier than S.A.E. 20.

Pontiac Steering Wheel

A few reports have been received about a scrape when the steering wheel on a 1938 Pontiac is turned to the extreme right or left. This occurs only on cars equipped with standard steering wheel and safety-shift gear control. This is caused by the reinforcing ribs on the steering wheel hub striking the anti-rattle spring boss of the gear shift control upper support. To correct, remove steering wheel, file or grind reinforcing ribs of wheel just enough for clearance and replace wheel.

Carter Carburetor

When a 1937 Carter Carburetor is installed on a 1935 or 1936 DeSoto or Chrysler, the choke lever and screw assembly from the old carburetor should be used on the new unit to avoid difficulty when connecting up with the Sisson choke.

Graham Carburetors

A new downdraft Marvel Model C-2, 1¼ in. carburetor No. 10-1808 and a new Model C-3, 1½ in. carburetor No. 10-1809, are now in production for the 1938 Graham Cavalier and Supercharger models respectively. There is a concealed range adjustment for high speed adjustment, which makes possible proper adjustment of the carburetor for different grades of fuel and for different atmospheric and temperature conditions, including altitude, without the necessity of changing jets, as was required on the older Model B Marvel carburetor. This range adjustment is inside the fuel bowl and it is necessary to remove air cleaner and plug in bowl cover to permit use of small screw driver on range adjusting needle. Carburetors are shipped from Marvel-Schebler plant with this range adjustment needle set fully open. One turn of the needle seat gives full opening, but to take care of production variables, all needles are set on the assembly line at approximately two turns open. To lean up either No. 10-1808 or No. 10-1809 Graham 1938 carburetors, it is necessary to first turn the range needle gently down against the seat, and then reopen approximately one turn, and from this setting proceed to turn needle down again, to cut down fuel flow, until proper setting is reached.

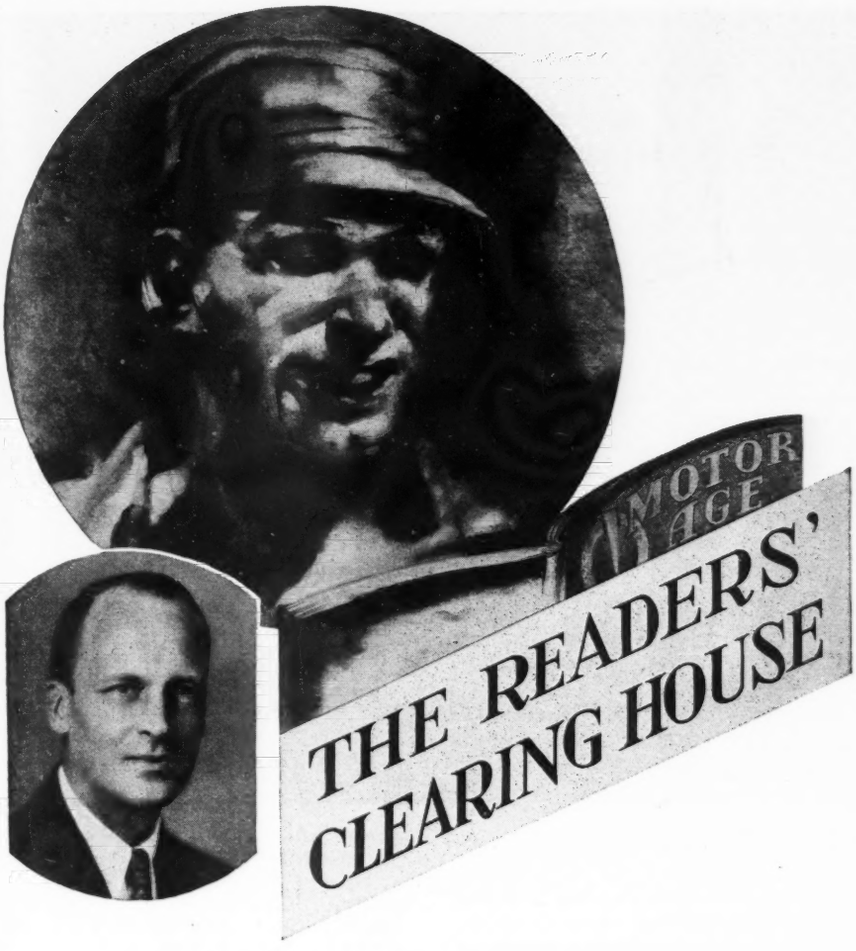
Studebaker Window Regulator

Production tolerances may permit a front door glass on 1937 Studebaker cars to extend slightly above the level of the window opening when the glass is in the lowered position. If a condition of this kind is encountered, adjustment can be made as follows: Loosen the window garnish moulding sufficiently to free the door trim material. Pull the upper door trim from the door. Loosen the three screws which retain the regulator assembly to the door inner panel and shift the position of the regulator until the desired adjustment is obtained. The screw holes are elongated sufficiently to provide for any needed adjustment of the assembly.

Plymouth Performance

Engineering advises on Plymouths giving ragged performance from 20 to 30 m.p.h., or weakness on ¾ throttle from 10 m.p.h., the water temperature should be brought to at least 160 deg. 1938 carburetors are set for maximum mileage and unless motor is properly tuned and water temperature is held at specified point, ragged running from 20 to 30 m.p.h. may be noticeable.

"If you weren't in the automobile business they wouldn't have thought of throwing old shoes at us!"



BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of Motor Age together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

When Ford Heads Are Frozen

I have found many helpful suggestions in your "Readers' Clearing House" column.

We are having a great deal of trouble removing the aluminum cylinder heads on late model Ford V-8's. On those with which we have trouble there is always a white powdery corrosion all around the stud bolts which holds them on. We have tried using gasoline, alcohol and ether to dissolve this corrosion—but it does not help much.

We have had several Fords on which we have started the motors with all the nuts completely loosened and still they wouldn't come loose. Can you suggest some chemical that might dissolve this corrosion, or do you know of some method that might help us on these stickers? Griffith's Garage, 425 Sioux St., Sioux City, Iowa.

FIRST of all, the trouble is undoubtedly caused by the use of certain types of anti-freeze which results in the corrosion. I would suggest that you stick to high quality anti-freeze, only.

I don't know of anything that will dissolve it very readily but some mechanics claim that Pyrene will do the trick. However, I think your best bet is to take the nut off the cylinder head stud and then use a stud remover to pull all the studs. After that, the cylinder head should come off fairly easy. Of course, pulling the studs would probably spoil them and it will be necessary to buy a new set but, I really think it is by far the easiest way of doing the job.

Some mechanics say that it is possible to remove the heads by means of a chain hoist and then, as you start to apply some pull, tap the head slightly with a mallet. Personally, I would be a little afraid of stripping the threads of the spark plug holes if you do it that way. Other mechanics claim that you can pull them by heating the head with a torch and then by tapping lightly with a mallet they come off without much trouble. Personally, I have my doubts as I have never seen it done myself and, consequently, I vote for the removal of the studs.

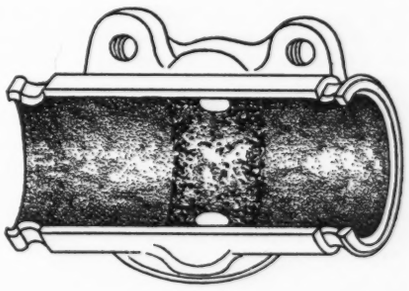
Trouble With Hydraulics

We recently relined brakes on a Plymouth; did not touch anything on the hydraulic system. After the car was out a few days it came back with a leaky wheel cylinder. We cleaned the cylinder, installed new cups. After a few days it was back again with a leaky cylinder. Cylinder was then taken off, honed, new cups installed and went out and stayed out.

We realize that honing of cylinders sometimes is necessary. We would like to know if changing lining, which in our opinion has nothing to do with the cylinders, started this leak and why.

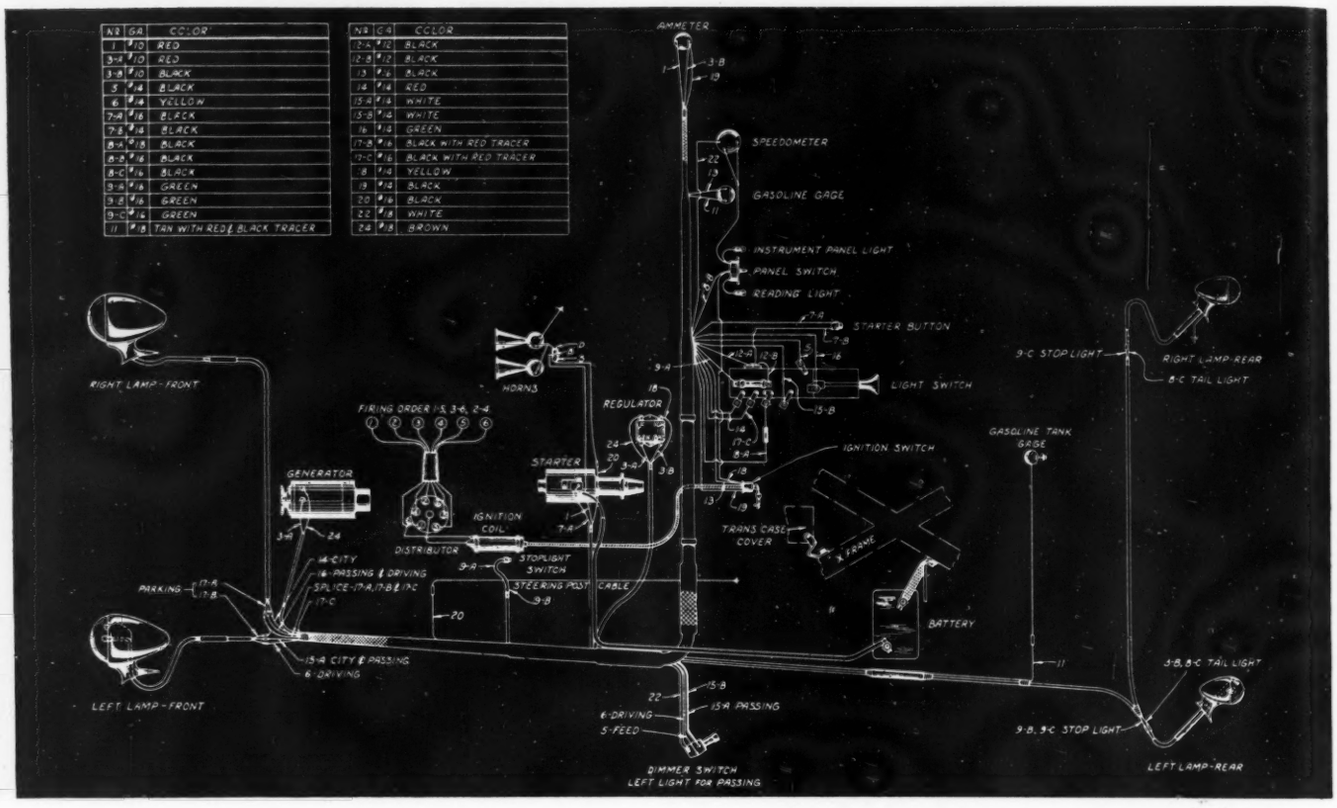
IN brake cylinders fluid has some reaction on cast iron and other metals and materials which cause some solid matter to be developed which you cleaned out. But, in addition, water, which has an affinity for brake fluid and eventually gets in there, will cause a corrosive condition. Whenever you take an old cylinder apart you will find that there is some corrosion in same, mostly on the bottom of the cylinder as it seats in the car. Water and acids in the fluid sink to the bottom and attack the cast iron there.

In the Plymouth brake system, as brake lining wears and you readjust shoes, the cup which holds the fluid is always moved slightly out towards the end of the cylinder. In other words, it always sits on the clean portion of the cast iron bore. When you reline brakes, the cup is pushed



back into the cylinders over the dirt and rough spots which cause leaks. The first time you cleaned the cylinder and put new cups in, you evidently overlooked pitmarks on the bottom on which the cup, due to relined brake, sat—which still caused the leak.

When you honed, you removed all pitmarks, consequently installation of the new cups was effective.



NO	GA	COLOR
1	#10	RED
3-A	#10	RED
3-B	#10	BLACK
5	#14	BLACK
6	#14	YELLOW
7-A	#16	BLACK
7-B	#14	BLACK
8-A	#18	BLACK
8-B	#16	BLACK
8-C	#16	BLACK
9-A	#16	GREEN
9-B	#16	GREEN
9-C	#16	GREEN
11	#18	TAN WITH RED & BLACK TRACER

NO	GA	COLOR
12-A	#12	BLACK
12-B	#12	BLACK
13	#16	BLACK
18	#18	RED
15-A	#16	WHITE
15-B	#16	WHITE
16	#16	GREEN
17-B	#16	BLACK WITH RED TRACER
17-C	#16	BLACK WITH RED TRACER
18	#18	YELLOW
19	#14	BLACK
20	#16	BLACK
22	#18	WHITE
24	#18	BROWN

1937 Six Cyl. Packard Chassis Wiring Diagram. Does not include body wiring

In honing wheel cylinders, the outer parts where the pistons rest, usually do not get any wear at all—they are fairly smooth. Most of the honing and polishing should be done where the pitmarks are in the center of the cylinder, as shown on the accompanying illustration—take particular notice that all pitmarks which are heaviest on the bottom of the bore, are removed.

We are now getting out a new honing instruction sheet to go with our new hone which covers this fairly well, as a matter of fact gives more details than any other I have seen up to the present. If you would want to put a caption that the repair trade can get such instruction sheet from us, we will be glad to furnish same on receipt of such requests.

We have recently had difficulty with a car where we were forced to install new master cylinder cups every three weeks. The cups we took out showed a heavy gouge across the face as cups move back and forth in the cylinder. The cylinder seemed to be clean and perfect in all respects. After the third cup was installed, we bought a new cylinder, installed it and it has now been running for two months. Can you solve this problem for us?

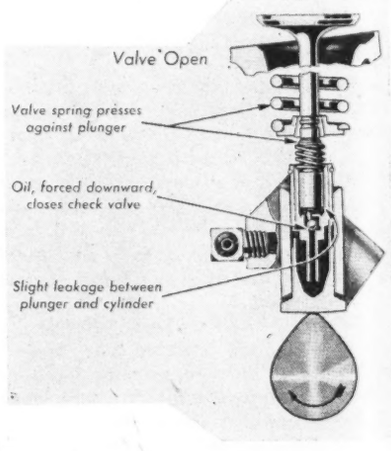
THE gouge across the face of the cup was undoubtedly caused by an enlarged compensating port. This hole is intended to be very small, hardly over .010 in., equivalent to a No. 80 size drill. In examining a wheel cylinder you will observe a hole about 1/16 in. drilled as the entrance of this compensating port. However, the bottom is drilled through with the small drill above referred to. Under no circumstances should this hole be enlarged. It should be cleaned with a wire which is usually employed to fasten tags with. The moment this hole is enlarged, as the cup passed over this orifice, with internal pressure set up on the inside of the cup, it tends to push the rubber into the hole. When additional pressure is exerted and the cup forced past this hole, it readily cuts the rubber, creating the gouge you referred to. It is important that this hole is as small as possible, yet it is equally important that it is open. In assembling the cylinder and adjusting pedal, it is well to test that cup does not cover this hole nor that it is clogged. Locked brakes will definitely be the result if this hole is not clear when the system is at rest.

The above questions and answers on hydraulic brakes were supplied by E. Schwarz of Eis Manufacturing Co.

Carbon and Valves on La Salle

I have been servicing a V-8, 1937 50 LaSalle and I expect to grind the valves on this car. And, as I am not thoroughly familiar with valve maintenance on this particular model, would appreciate any information in regard to this job. Would also appreciate some information on the hydraulic valve lifts on this car. C. L. Lewis, Motor Repair Shop, U. S. Arsenal, Augusta, Ga.

THE manner in which these valve lifters operate is as follows: Oil is forced under pressure directly to each tappet body through the longitudinal passageway drilled in the valve guide casting. From this passageway oil enters the chamber inside of the valve lifter body through a small hole leading into the plunger cylinder. The oil pressure opens the ball check valve in the inner cylinder, permitting oil to pass into the space in the cylinder below the plunger.


Valve Open
Valve spring presses against plunger
Oil, forced downward, closes check valve
Slight leakage between plunger and cylinder

When the cam brings the valve lifter up against the resistance of the valve spring, the oil in the inner cylinder is trapped by the ball check

valve. This prevents the plunger from sliding down into the cylinder, and with the valve lifter spring keeping the plunger in contact with the valve stem at all times, zero clearance is maintained between the stem and lifter, providing silent valve operation.

To remove the valves from the LaSalle, it is necessary first to remove the valve lifter assembly. The valve spring keepers can then be removed by compressing the springs with a valve lifter of the "C" type. Before reinstalling the valve lifter assembly, the valve stems should be checked for proper length by means of a special gage which can be secured from any Cadillac agency. If the valve stems are too long, they should be ground off until the tool will slide into place. Installation of the valve lifter assembly is greatly facilitated by the use of a tool which holds the tappet plungers down.

However, in general, you will find that it is not necessary to grind down the length of the valve stems until the valves have been refaced several times.

Cuts Out Over 55

I have a late 1933 Hudson 8 on which I ground valves, had coil checked, overhauled and rebuilt carburetor. Put in new diaphragm in fuel pump, new gas line from fuel pump to carburetor. Had distributor checked over.

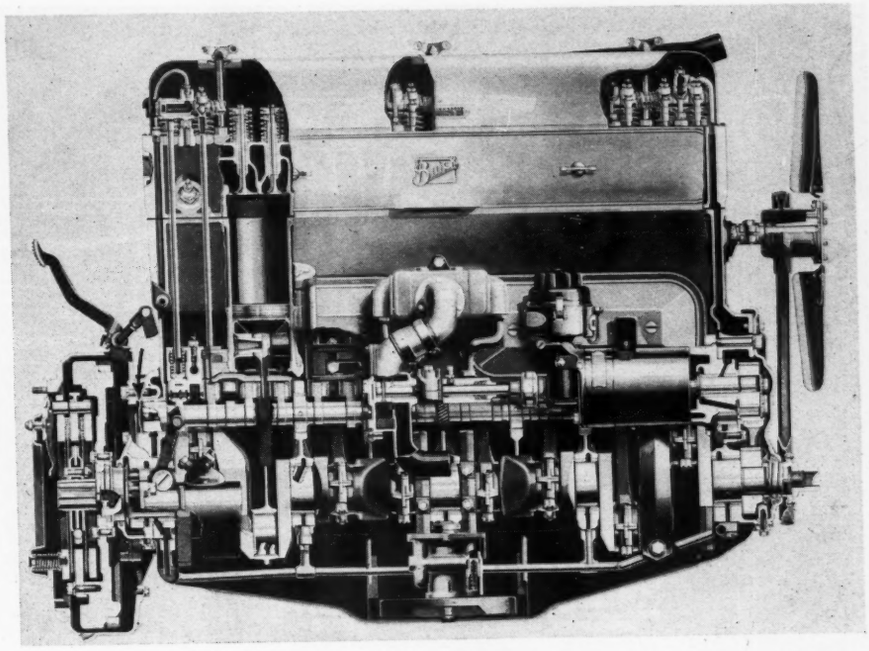
When I tried to go over 55 m.p.h. it cuts out and starts to pop back. C & C Auto Works, 2122 West Pico St., Los Angeles, Calif.

THERE are several conditions that could contribute to this difficulty, but it seems to me that the most important one is a bad condenser. Your letter does not state that the condenser has been tested and my first suggestion is that you install a new condenser, as I believe it will go a long way toward eliminating cutting out at high speed.

Another point that should be checked is the condition of the spark plug wires. It is quite possible that the wires are old and under high speed conditions are developing leaks causing the spark to jump from one wire to the other.

Although you mentioned that you have ground the valves, I am wondering if you cleaned out the valve stem guides. The condition you mention could be caused by valves sticking at high speed and by weak valve springs. If the points mentioned above do not correct the trouble, I suggest that you install a set of new valve springs and while you are doing that, run a reamer down through the valve stem guides to be sure that they are free of carbon.

While your description indicates some of the characteristics of vapor-lock, I do not believe that it is a contributing cause because your letter does not mention that he has difficulty in starting the engine when it is hot.



1931 Buick

Needs a Gas Mask

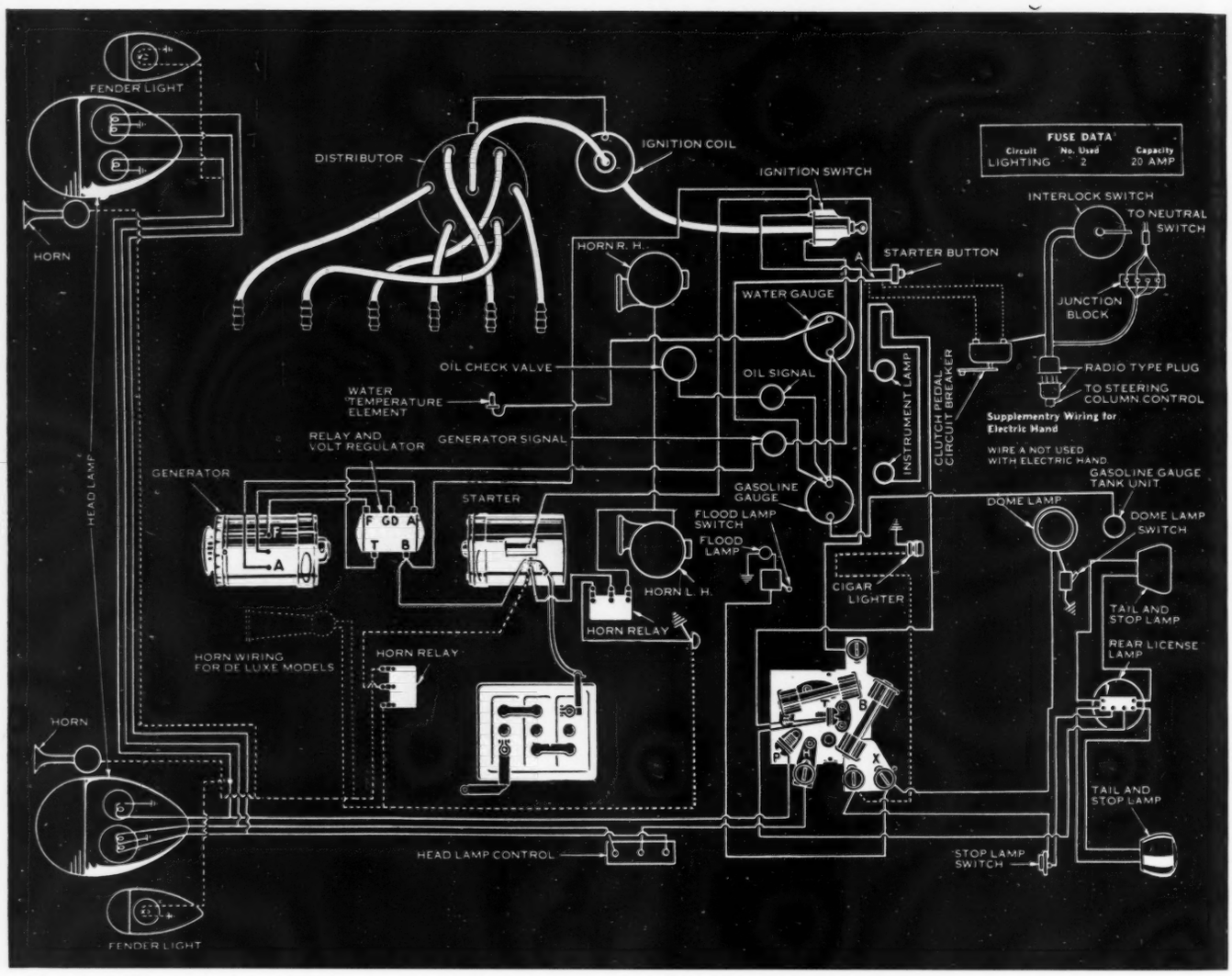
We have a 1931 Model 8-50 Buick sedan on which we are having trouble with oil fumes coming into the interior of the car and we have done the following: Installed a set of new piston rings, new piston pins, adjusted all bearings, installed new distributor points, distributor cap, condenser, valves ground, complete motor tune-up, still when we drive the car and release the gas to slow up we get the fumes in the car. C. J. Dean, Dean & Greenlaw, New London, Wis.

ONE thing you might do on your Model 8-50 Buick, which is giving you excessive blow-by, which in turn results in fumes entering the car, would be to carefully go over your exhaust pipe, including manifold, exhaust pipe muffler and tail pipe to make sure that they are not rusted through at any point, and that all the joints are tight.

I would also make sure that the breather is clear and unobstructed and, in this connection, you might attach a length of flexible tubing to the breather so as to bring the outlet well under the car.

It is also possible that the cylinders were worn so much that the rings are not able to hold the blow-by, in which case it will be necessary to rebore the cylinder and install oversize pistons.

"That gives me a swell idea for some book-ends!"

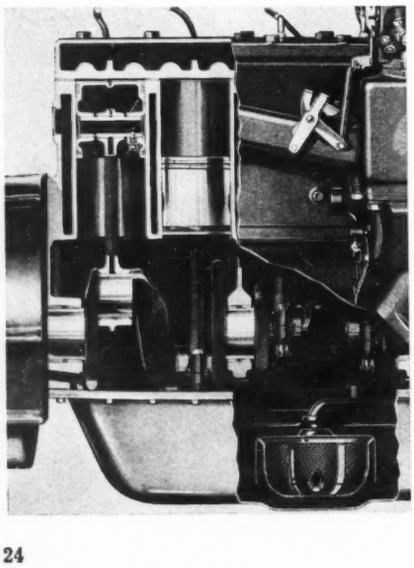


1937 Hudson 6 and Hudson Terraplane wiring diagram

Another Oil Leak

Our car owner has a 1936 *Pontiac* 8 *which has an oil leak through rear main bearing. Rings were replaced and valves ground a few months ago. After rings were replaced the motor did not use any oil driving on short trips, but when this owner took a* 300-*mile trip driving at around* 60 *m.p.h. he used eight quarts of oil. We checked and found the oil leaking at rear main bearing. We removed oil pan, checked bearings and found it in good shape. There is no oil seal on rear main. It just drains or is supposed to drain back into oil pan.*

The oil filler cap and crankcase ventilator are clean. We cut a ventilator in clutch inspection plate cover to overcome any vacuum which might create in clutch and flywheel housing. This did not do any good—it still throws out oil at high speeds and long trips. How can we correct this trouble? S. D. Sprunger, Walkerton Oil Co., Walkerton, Ind.



ON your 1936 Pontiac 8 that is leaking oil at the rear main bearing, I would suggest that you make an oil pressure test on this engine to make sure just where the oil is leaking.

It is possible that the plug at the camshaft rear bearing is leaking, so that the oil drips down past the main bearing and into the flywheel. This, of course, has the appearance of a rear main bearing leak, and to overcome it it is necessary to install a new plug.

In addition, there is a possibility that the drain tube on the main bearing is clogged, which would, of course, cause your trouble. Furthermore, in the rear main bearing cap there is a drilled passage from which the oil flows into the drain tube. The end of this passage is sealed with a plug, and if this plug has gotten loose, it might also result in the trouble you are experiencing.

Also, be sure that the groove drilled in the main bearing is clear, for, if it is clogged with sludge, it will not force the oil into the passageway and into the drain tube.

Rear Wheel Hub

I have just had a 1934 *Oldsmobile* 8 *in my garage for a rear axle shaft bearing; this is the outer bearing. My customer said that this was the fourth one he had put in. When I tore this job down I found that the bearing was O.K. but it was loose on the shaft, so I installed a new axle shaft. I checked the housing but could not find*

anything wrong. He said that the bearing would last about four months and then break up.

Any information would be greatly appreciated. This is the first job I have had on his car and would like to lick it for him. A. Haroldson, Girard's Service, 22200 Gratiot at Ash, East Detroit, Mich.

THE first thing I would do on your 1934 Oldsmobile 8 would be to check the key, keyway and rear wheel hub. It is my belief that the hub is riding on a high spot on the key, with the result that excessive strain is placed on the rear wheel bearing. Unless the key is making at least 75 per cent contact with the keyway in the hub, I would suggest that you install either a new hub or carefully dress the key until it fits better. Also be sure that the key is tight in the keyway in the axle shaft.

Knocks After Ring Job

A 1934 Standard Chevrolet came into my shop for a ring job. I put in a good ring, ground valves and tightened connecting rod bearings. The pistons and pins were in good shape.

The motor runs fine and pulls good, but there is a rattling knock in the motor at most any speed if it is not laboring. It sounds a little like pins, but they are in good shape. Owner says this knock was not in car before.

There are other Chevrolets that come into my shop with the same noise. Campaign Garage, Campaign, Tenn.

THERE are several possible causes for the knock you describe you are having on the 1934 Standard Chevrolet. It might be timing gears, it might be end-play in the camshaft and it might be camshaft bearings.

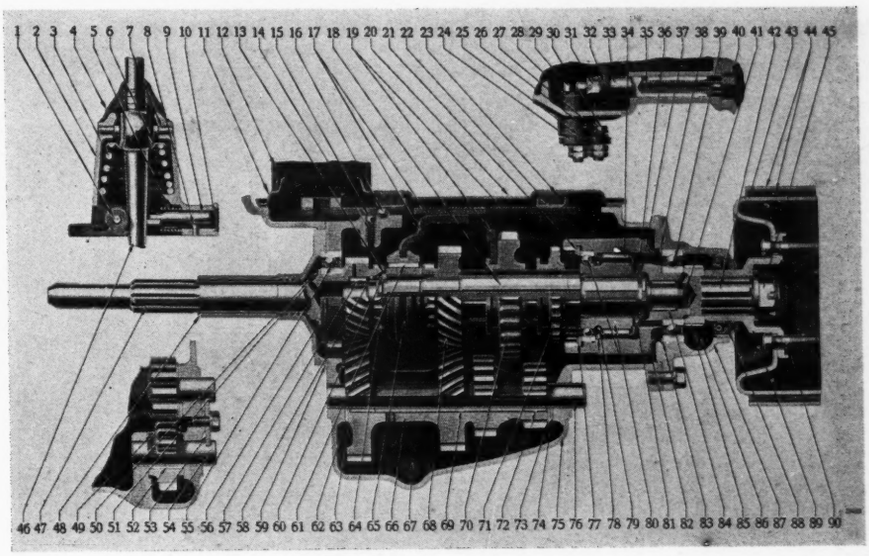
There is also the possibility that in spite of your examination of the rings and pistons that it might be piston slap or a pin knock.

As you know, it often happens when rings are installed that piston slap and pin knocks will show up when they hadn't done so with the old set of rings. I would also strongly advise making a careful check for a bent connecting rod.

Locks in Gear

Since I subscribed to the Chilton Flat Rate Manual and Motor Age magazine, I say they are worth their weight in gold. Here is a little problem for the "Readers' Clearing House."

I have a 1933 Plymouth, Model PD sedan and if it is not properly shifted the transmission gears will lock. For instance, when the gear shift is pushed between reverse and second or first and high gears. Can you list the causes and remedies for points that pit and turn black with dirt and motor gets a slight miss? Joe Jacus, Joey's Motor Service, P. O. Box 136, Manville, N. J.



1933 Plymouth Transmission

THE first thing I would check on your 1933 Plymouth Model PD transmission is the end play of the second speed gear, free wheeling drive shaft and counter shaft gears. The end play of the second speed gear is controlled by shims at the snap ring which hold the transmission clutch gear in place. The maximum amount of end play at this point is .002 inch. Unless the end play is properly adjusted by the shims as indicated, difficulty may be experienced in negotiating hills with free wheeling locked out.

End play at the counter shaft gear assembly is controlled by thrust plates at each end of the counter shaft gear cluster. End play at this point should not be more than .005 inch.

I would also make sure that the various gears are not worn and that the free wheeling rollers are also in good condition.

In regards to pitting and burning of ignition points, this is, of course, generally caused by a defective condenser. In this connection, I would like to point out that many condensers apparently test O.K. but will not operate well in service. I therefore suggest that you try a number of condensers until you overcome the trouble. In addition, make sure that all your primary electrical connections are in good condition, particularly those at the battery and at the ground and that the distributor shaft bushing is not worn in excess of .003 inch.

MOTOR AGE INDEX

A Handy Digest of Important Articles Which Appeared in Motor Age During '37

Accessories and Accessory Service:

Clean up on windshield cleaner service	February,	Page 20
Wake up accessory sales	April,	Page 26
Increasing sales with equipment and accessories	October,	Page 28
Accessories increase the service dollar	December,	Page 20
A catalog of new products	December,	Page 33

Accounting:

The A B C's of shop bookkeeping:		
Part I—Chart of accounts, sales analysis book, billing procedure	May,	Page 30
Part II—The cash book	June,	Page 26
Part III—Compensation insurance, pay roll, social security	July,	Page 24
Part IV—Closing the books, preparing financial statements	August,	Page 36

Batteries:

Building a better battery business	May,	Page 20

Bearings:

Pre-loaded bearings	May,	Page 20
Care and adjustment of bearings	March,	Page 20

Bodies:

Curing body "bruises" easily and profitably	June,	Page 22

Brakes:

Brake service on 1936 Bendix duo-servos	February,	Page 14
Adjusting Ford brakes	April,	Page 24
Maintenance on Cord brakes	July,	Page 27
Servicing Warner electric trailer brakes	August,	Page 21
Stopping the brake groan	February,	Page 32
Eliminating squeaking brakes	June,	Page 36

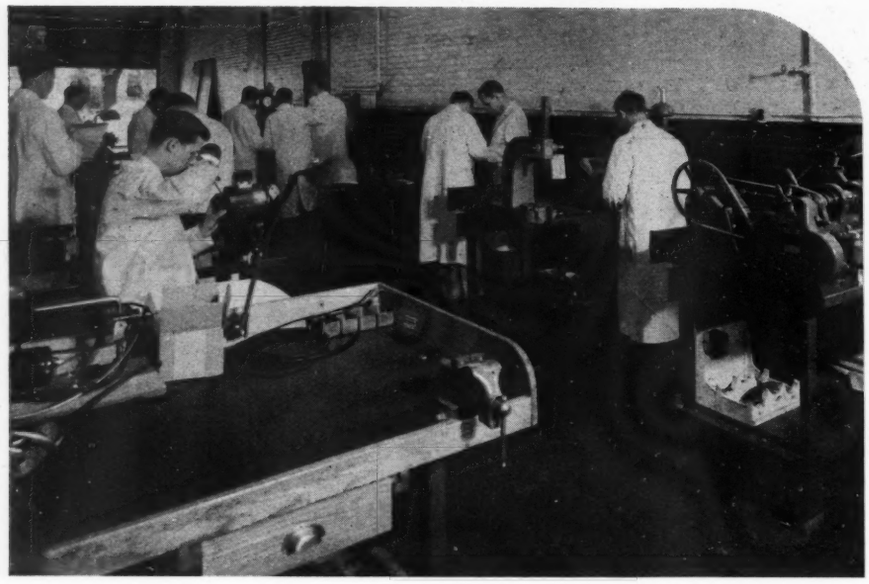
Clutches:

Adjusting and repairing Borg and Beck clutches	February,	Page 24

Compression:

Restoring compression	August,	Page 18
Increasing compression ratio	August,	Page 30

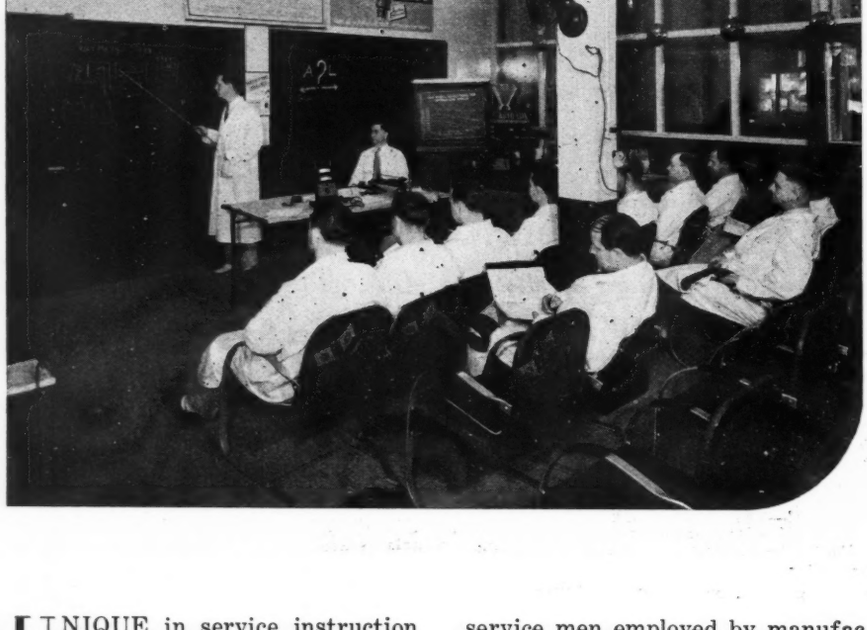
(Continued on page 56)



(Left) Students doing shop work at the Auto-Lite Service school. (Below) View of classroom during examination.

School Days For Service Men

Auto-Lite Service School Provides Electrical Study



UNIQUE in service instruction work is the school which The Electric Auto-Lite Company is conducting at Toledo, Ohio, for automobile electric service men. The course, which lasts three weeks and covers all phases of automotive electrical equipment, is free to employees of any Electric Auto-Lite Central Distributor, Service Distributor, Service Station or Parts Dealer. Also eligible to attend are service men employed by manufacturers using Auto-Lite electrical equipment, and employees of fleet operators whose units are similarly equipped.

The Auto-Lite Service School is a development of the educational field work which the company has been doing for the past three years, with portable equipment carried in a trailer. It was thought that if service men could get away from their places of business, and enjoy a change of scene while attending the school, that they would be able to work without interruption and thus give their undivided attention to their studies. Consequently, it was deemed advisable to bring the men to the school, instead of taking the school to the men.

As the members of each new class come to Toledo, they are given a get-acquainted dinner at one of the leading hotels, followed by moving pictures showing interesting operations in some of the 21 plants which Auto-Lite operates in 18 different cities.

Following the first-night dinner and movies, the students get to work with a vengeance. Schedules have been arranged to leave weekends and evenings free; but the course covers so much ground in such a short period that students find it necessary to devote practically all their spare time to study in order to obtain, upon examination, a rating satisfactory to their employers and to the Electric

(Continued on page 44)

A Letter from Hal Roe —who finally got his job to rev up

DEAR BILL:

If I hadn't been so darned busy as a result of our customary cold weather starting, and the resultant lot of grief with "hard starters," etc., I would have written sooner.

As a beginning, I certainly want to extend through your channels, a hearty thanks to all the boys in gasoline alley who have taken enough interest in my troubles to write me personally or to you. I was flabbergasted at the response given my letter. I received tips from coast to coast, North to South and telepathically—almost.

As I told you before, I had in mind putting a larger tail pipe and a straight through by-pass muffler on the 1932 Studebaker for better scavenging. This I did—with the same results, no go. I tried another make of carburetor but the top stayed down per usual. While trying out the new carburetor, I ordered a set of gaskets and accelerating pump diaphragm for the Winfield, figuring I might be able to peddle it if it was overhauled and good as new. (It was only six months old as it was, and in perfect condition anyway.)

Well, to make a long story a little shorter, after overhauling the Winfield, I took a foolish fancy to put it back on and give it another try. Here's what happened: After setting it with our exhaust gas analyzer to about 80 per cent average, the same as before, I took the car out and let it go. It did, to an even 100 m.p.h., and believe me the road was nothing but a dirty brown streak. When I kicked it open I could notice a different feeling to the hack than it ever had before, so I just let her go. When it got up to 80 it started to detonate something fearful and I retarded the spark with the hand control until it was just pinging a little. The faster I went the more I had to retard it, but giving the devil his just due, I'll have to admit it sure did ramble.

After this performance I was so enthused I put in a new set of valve springs and dampers as a just reward for good behavior. To date I haven't had a chance to see if it would give a repeat performance but I have a notion it would do so without any trouble.

Now to analyze the situation. Starting with the carburetor—in overhauling it, it was clean. All gaskets were good, float level correct, accelerating pump diaphragms fair, always went to a full wide open position through the linkage. Settings by the analyzer were 80 per cent, same as now. Same make and grade of gasoline, fuel-pump unchanged, nothing on the manifold was changed and, to the best belief and knowledge, nothing was done to alter the gas system in any way outside of changing the carburetor.

Hal Roe

From the ignition standpoint, that seemingly too high or might we say too rapid advance rate was nothing new to me as I have always had it that way since I put the 7.1 head on. The Mallory distributor I have set at its lowest advance possible, 15 deg. The governor springs also are set up to their slowest advance rate, being all in at around 4000 r.p.m. on a straight line graph. Point setting is correct for the particular model but was unchanged as well as the rest of the electrical system before the run. The spark plugs were gapped to 0.035 as recommended by Professor Mallory.

All chassis units were the same as usual. In fact, I heven't as yet changed to winter grades of transmission and rear end grease, as I should. The heavy grease probably held it down some, as a matter of fact.

The supercharger was not on as I previously mentioned in another letter. I am changing the gear drive over to a V-belt layout to stop the noise derived from the gears.

From the physical standpoint, there was no wind and to make sure, I turned and repeated the performance.

All this cussin' and discussin' only leads up to a lot more, like the house that Jack built.

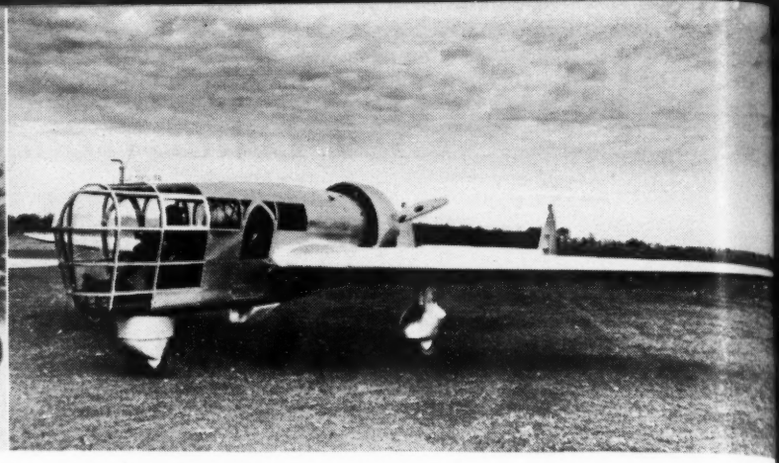
From the carburetion angle, there might have been a leak in one of the gaskets from the factory that caused a starving at high speed, but, from observation, the setup was O.K.

The ignition angle is a queer one, as it was unchanged.

Speaking of peaking out, with the 7.1 head and high lift camshaft, my motor is supposed to turn out 196 hp. at 4400 r.p.m. By that, up to 4400, the faster I go the stronger the motor should get. So, by "facts and figures" the darned thing should wind up to at least that point, when I will gracefully exit. When it was doing 100, I didn't have time to look at the tach to see what it was winding but, it must have been turning around 4000. For all I know, it might have gone faster but the darned road (an offset of the main drag in town) was too short to hold it wide open for more than a mile. What effect the supercharger will have on it when I get time to finish revamping it, I don't know. Time alone will tell.

Going back to the symptoms, the job always did do this one thing: When it got up to 70, the gas pedal was half way down. When I put it wide open, regardless of spark setting, it would do nothing but stay at 70 and ping its head off. By that it would seem as if it had reached some sort of a peak it

(Continued on page 49)



(Top around to left)

Glass nose on this plane was developed for greater visibility in aerial map making. To us it resembles an old type "pusher" plane in a bottle.

Not enough snow caused failure in tests of one of New York's new snow removal machines. It removed gravel, too, which eventually clogged the gears.

Riding high is this German policeman during an exhibition at Munich. All he had to do was climb up and down the ladder while traveling about 30 m.p.h.

Hay-Sweep, motorized, is replacing horse drawn sweep on Nebraska farms. This sweep moves as much hay in 2½ hours as two horse sweeps working a full day.

New accessory line for garages was discovered in this Paris shop. Police found cache of machine guns stored in attempt to overthrow government.

Eyston's Log of Bonneville Speed Record Attempts

Here is the "diary" of events in Capt. George Eyston's quest for the world land speed record—mute evidence of a speed king's victory over disheartening odds:

December 19 (1936)—First official challenge to Sir Malcolm Campbell's title as world speed king since Lee Bible's fatal record attempt at Daytona Beach in 1929, came at Salt Lake City, Utah, with announcement that Capt. George Eyston was preparing a giant car in London.

August 31—Captain Eyston docked in New York City, after a voyage from his native England, and remained there long enough to describe his new "Thunderbolt" as the "craziest automobile ever conceived."

October 8—At Bonneville Salt Bed, 120 miles northwest of Salt Lake City, near the Nevada border, the record aspirant "warmed up" his giant car for the first time. It had not been run in London and its possibilities were "theoretically" determined.

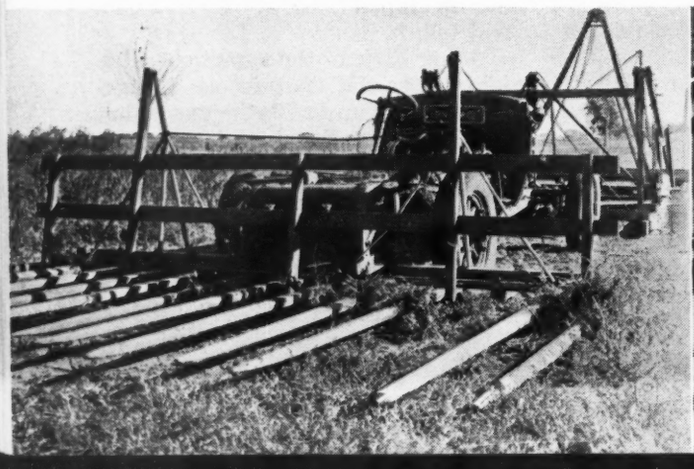
October 9—The first planned attempt at the record—and the first disappointment! While the 24 cylinders screamed, Eyston struggled to get the car out of low gear. And the run was postponed to await correction of a high spot in one of the gears which prevented shifting.

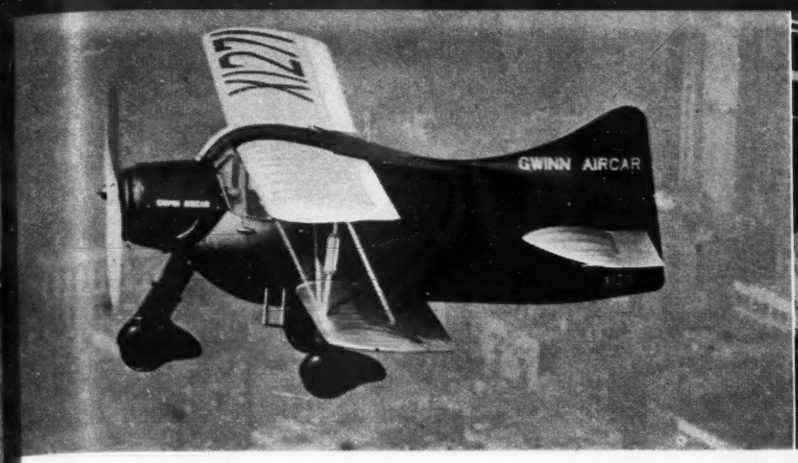
October 14—Came the first hint of success, but that, too, faded within 15 hours. To "soothe his nerves" while waiting repairs on the "Thunderbolt" Eyston began a 24-hour run with his smaller "Speed of the Wind" and when he was forced to quit after 15 hours all he had to show was a new record for 2000 kilometers at 163.60 miles per hour. He started the run at 1:30 a. m. amid threatening conditions and rain finally halted the attempt.

October 18—"Thunderbolt" was ready, but disappointment continued to "hound" the trial. Rain forced postponement of a scheduled trial.

October 28—The weather cleared, and Captain Eyston drove "Thunderbolt" over the measured mile of the 13-mile course at 309.61 miles per hour—but tough luck again held the record from his grasp. His speed did not go into the record books, for he failed to make the return trip in the two-way run required by international speed rules. At the two-mile mark on the return trip, transmission trouble again halted the car.

(*Continued on page* 46)





(Top around to right)

Tricycle landing gear is one feature of a new plane designed for the "man in the street." Operating controls resemble those of an automobile. It has no rudder.

Work goes on at the Ford motor plant despite picketing at the gates. Officials refuse to recognize pickets as "strikers," continue operating as usual.

Ferris Wheel parking in Pittsburgh enables a lot of cars to be stored in a small space. Wonder how many customers want to stay on for the ride?

Climbing up to see the signs is Miss Gaila McEntee who is inspecting this international guide post erected at the site of the San Francisco 1939 exposition.

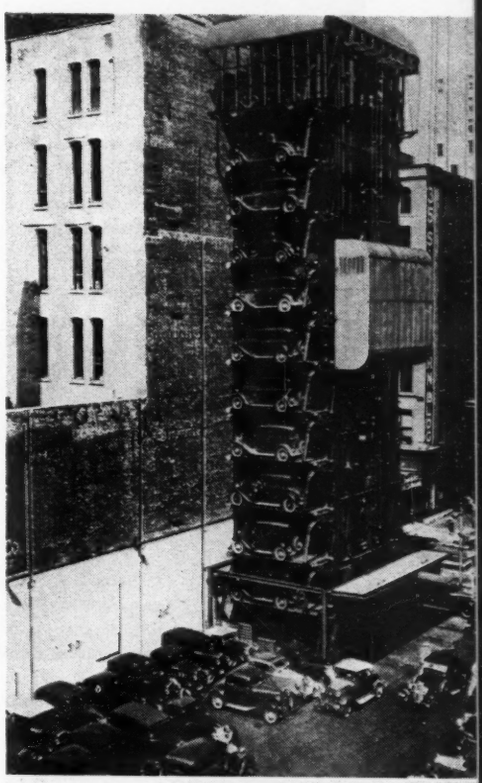
Half-pint plane being dragged off the Miami field by S. J. Wittman after it had carried him 270 m.p.h. to win the handicap invitational race. Looks like a model.

Congress Considering Repeal of Gasoline Taxes

Motorists are hopefully following news from the meetings of the House Ways and Means tax sub-committee in Washington, which is now studying the possibility of repealing or reducing the Federal gasoline tax and other automotive excise levies, D. H. Bohler, Chairman of the Alabama Petroleum Industries Committee declared.

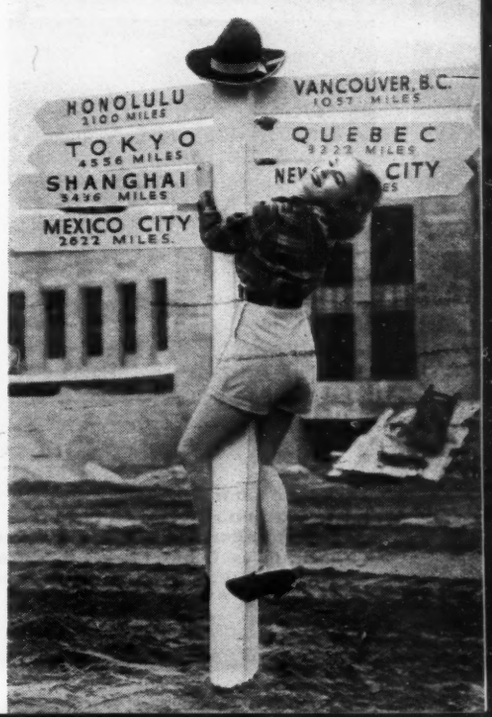
"According to the announcement made by Chairman Vinson of the House Committee, investigation of $650,000,000 of miscellaneous and nuisance taxes, enacted in 1932 as temporary emergency tax measures, will be undertaken to ascertain the possibility of reducing or repealing some or all of these taxes, which have proved unpopular since their inception.

"Elimination of the Federal Excise taxes on automotive products would mean a saving of $3,336,000 to Alabama motorists, a reduction of 18 per cent in the average motorist's annual $77.02 automotive tax bill," Mr. Bohler said. "In view of the fact that the average motorist in this State has an income of only $25 to $30 a week and must now work from ten days to two weeks merely to pay the annual taxes on the operation of his car, there is obviously a need for automotive tax relief which abolition of the nuisance taxes would provide.



MEMA Monthly Business Index

(January, 1925, equals 100)	Oct. 1937	Sept. 1937	Oct. 1936
Original Equipment Shipments to Vehicle Mfrs.	176	149	144
Service Parts Shipments to Wholesalers	154	164	158
Accessories Shipments to Wholesalers	147	128	99
Service Equipment Shipments to Wholesalers	130	148	109
GRAND INDEX (Composite) of above divisions	160	149	138
Index Car and Truck Production	140	73	96
Index General Business (Bank Transactions)	70	69	81



News Notes of 1937

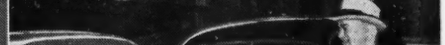
Henry Ford, seated in old model, is shown shaking hands with son, Edsel, when the 25 millionth Ford rolled off the assembly line.

Wilbur Shaw made the 1937 headlines when he scooted across the bricks at Indianapolis to set a new record at an average speed of 113.58 m.p.h.

1937 made history for the Chrysler Corporation as it marked the first time this organization had completed one million cars within the space of a year.

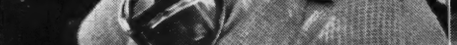
Scenes like the above appeared at automotive manufacturing plants when sit-downs, lock-outs and strikes of every style made the headlines of 1937.

Great Britain kept a tight hold on the speed crown as Capt. G. E. T. Eyston raced across the Bonneville salt beds at 311.42 m.p.h. to a new record.



1937 marked the 85th anniversary of the date Clem and Henry Studebaker opened their blacksmith shop at South Bend. Here's what developed.

Another familiar face of 1937 — the Auto Union. American drivers were more familiar with the appearance of the other end, but intend to do something about that this year.



William S. Knudsen succeeded Alfred P. Sloan, Jr., as president of General Motors. Just in time to get plenty to worry about from initials like C.I.O. and U.A.W.

Wide open spaces appeared in the drivers' compartments of many of the new cars as manufacturers swung toward installation of remote control and automatic transmissions.

Tire Industry Anticipates Eight-Hour Day

The tire industry which pioneered the share-the-work programs and the six-hour day five years ago, probably will be among the first of the major industries to seek reinstatement of the eight-hour day. As a matter of fact, the eight-hour day is just around the corner for major Akron tire manufacturers—and that corner may be Jan. 1.

If, as, and when the eight-hour day comes back to the tire industry, it will be accompanied by wage adjustments benefiting labor, and will restore the 24-hour day of three full eight-hour shifts. Industry observers see the impending reinstatement of the eight-hour day as the turning point for Akron and as the start of its civic comeback after two years of sitdown orgies and intensive decentralization.

It is recognized that the eight-hour day must be reinstated in the major Akron factories, if these plants are to compete on a cost basis with the subsidiary factories which Akron manufacturers have acquired under their decentralization program. Many of these subsidiary plants not only are equipped with the latest type of tire building machinery to speed production and cut costs, but now have the eight-hour day in many departments.

News of the impending eight-hour day has filtered through Akron's "gum shops" and it is believed that the rank and file of workers have become reconciled to it.

Acco Products Booklets

A booklet, issued by the American Chain & Cable Co., Inc., comprehensibly indexes over 200 different Acco Products; gives a breakdown of Acco Divisions and the products manufactured by each Division; shows a list of sales offices and warehouses for speedy handling of orders.

Conveniently sized—8½ x 3¾ in.—to fit in a desk file, this "Acco Products" booklet is a good 12-page reference book to use in conjunction with your directories of manufacturers.

Under Car Light Rides On Lift

Under chassis illumination to provide adequate lighting and at the same time eliminate blinding glare for cars up on the lift is provided by a new Liftlite designed by the Goodrich Electric Co., 2900 N. Oakley Ave., Chicago, Ill. The light is so designed that it mounts directly on the track of the lift and rides up and down with it. This mounting puts the light out of the way, and yet easy adjustment is provided with reflectors that can be rotated upward, sideways or downward. The reflector and lamp can be removed as a unit without disturbing the wiring, by simply lifting a spring-set plunger in the hood. To attach, it is snapped back in place and locked securely. For complete information, write the manufacturer.

Champion Orvis Schroyer, winner of the National Plowing Contest for the second successive year at Wheatland, Ill. Weed Bull Farm Tractor Chains helped with extra traction.

Hitch-hiking De Luxe

A hitch-hiker hailed Major Trammel Scott as he was driving out of Atlanta one evening. The major stopped and opened the door. The fellow looked inside the door, then brazenly asked, "Got a radio in there?" "No," replied the major. "Go ahead," said the hitch-hiker, "I'll wait for a car that has one."

Studebaker Adds to Keller's Staff

Two additions to the staff of George D. Keller, vice-president in charge of sales of The Studebaker Corp., have been announced. The men recently appointed to Mr. Keller's home office at South Bend, Ind., are Walker G. Everett, editor of the *Studebaker Wheel*, and William H. Bingham, sales promotion department of the Studebaker truck division.

UAW Ford Strike Makes Little Progress

Little progress is being made by the United Automobile Workers in their drive to organize Ford employes. The strike at the Ford assembly branch in St. Louis, which started Nov. 4, so far has been ineffective. Production has continued in the face of mass picketing.

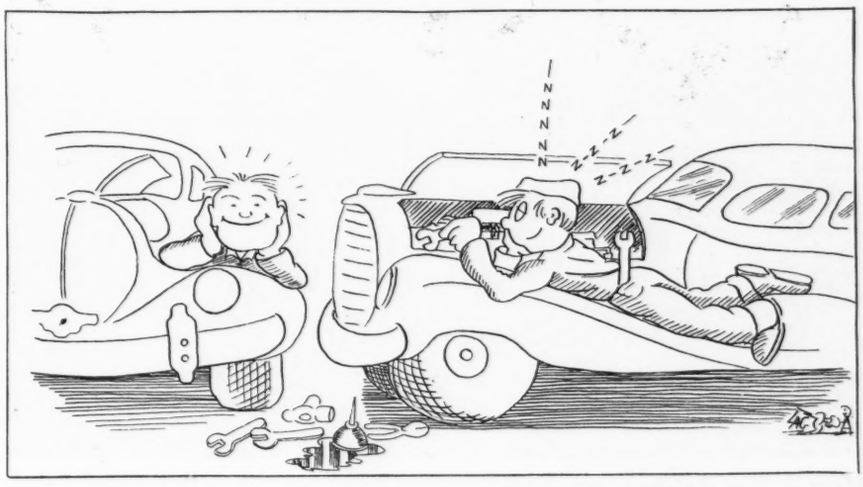
M. N. Johnson, plant superintendent, denied union charges that the plant was operating largely with imported labor instead of regular employes. Unsuccessful in their efforts to close the plant, the strikers, after three days of mass picketing, abandoned these tactics and posted only small groups of pickets at the plant gates. Union officials explained the change was made to avoid irritating police.

Ford attorneys had attempted to obtain a restraining order to prohibit mass picketing but failed to convince Circuit Judge Robert J. Kirkwood that there was "any reason for alarm."

Predicting eventual victory in the St. Louis strike, Richard T. Frankensteen said for the union, "we have 10 ways in which we can close Ford completely." Union members in the recently reopened Kansas City branch of the Ford Motor Co. were told to be ready for a sympathy strike.

The Fisher Body plant in Pontiac, which had been closed by a five-day sitdown strike that ended Nov. 22, began operating Friday, Nov. 26, in some departments. Full production was resumed on Monday when the Pontiac car plant, which had been closed for lack of bodies, also resumed. By Tuesday, both plants were back in full production, returning more than 14,000 men to work after a 10-day shutdown.

At the Chrysler plants where 10.-000 workers were laid off and a four-day week instituted as result of restricted production schedules, the union is attempting to extend a share-the-work program by urging adoption of a 28-hour week instead of 32 hours. Votes taken at the various Chrysler locals are said to have strongly favored the work-sharing plan.



"Boy! They certainly put out some comfortable models this year."

A New Suit for The Car

To the average mechanic, automobile upholstery is either something that always seems to be in the way when body repairs are being made, or something that comes in handy when the hands need a good wiping. But, whether it's put there to help or hinder, automobile upholstery is the product of an industry about which the average person knows little. Just for your interest we pass along the following short insight into this industry.

In the modern automobile there are two general classifications of fabrics: pile fabrics, and flat fabrics. Mohair velvet is classified as a pile fabric, and in the latter group are Bedford Cord, Whipcord, Broadcloth, Artificial and Genuine Leather. While artificial leather is classified as a flat fabric, it is more specifically a coated fabric. It simulates genuine leather with succesive coatings of pyroxylin or lacquer on a cloth back. The grain markings are pressed into the face of the fabric with a heavy plate or roller. Genuine leather, of course, is an animal hide.

Here are the essential differences between flat fabric and pile fabric. A flat fabric is woven in such a manner that the fibres lie flat or in a horizontal position, the sides of the fibres forming the face or wearing surface of the upholstery. A pile fabric is woven so that the fibres stand erect or in a vertical position. The tightly packed ends or tips of these fibres form the face of the fabric.

A pile fabric lends itself more readily to satisfactory cleaning for the small, erect fibres prevent the stain from spreading by breaking it up into fine parts. Stains on a flat upholstery tend to impregnate and spread along the length of the fibres and are thus difficult to remove.

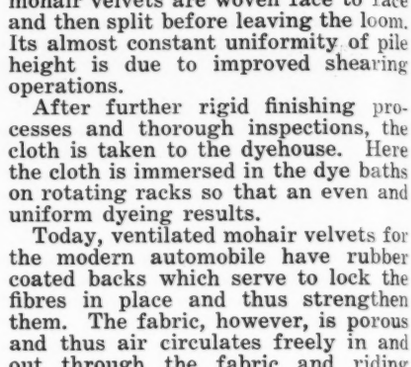
In the building of a motor car, the upholstery accounts for from about 7 per cent to 10 per cent of the manufacturing cost and the average five passenger sedan takes between 12 to 15 yards of material. Thus, the trim is an important factor in the building of an attractive and comfortable car. Mohair velvet has as a base the strongest and smoothest textile fibre known—the fleece of the Angora goat. This animal is raised commercially in this country chiefly in the states of Texas, Oregon, Washington, California, and New Mexico. The fibres are long, silky, and have a high luster. The sides of the fibres are smooth and even.

When the mohair is received at the mill, it is subjected to a series of sorting, cleaning, combing, carding, drawing, and spinning processes. The first step is to sort the fleece and this is especially interesting for it is accomplished by hand. Naturally, the men handling this work must be highly skilled and work with micrometer fingers. The fleece is laid upon a sorting table with a wire screen top through which dirt and other loose impurities may fall.

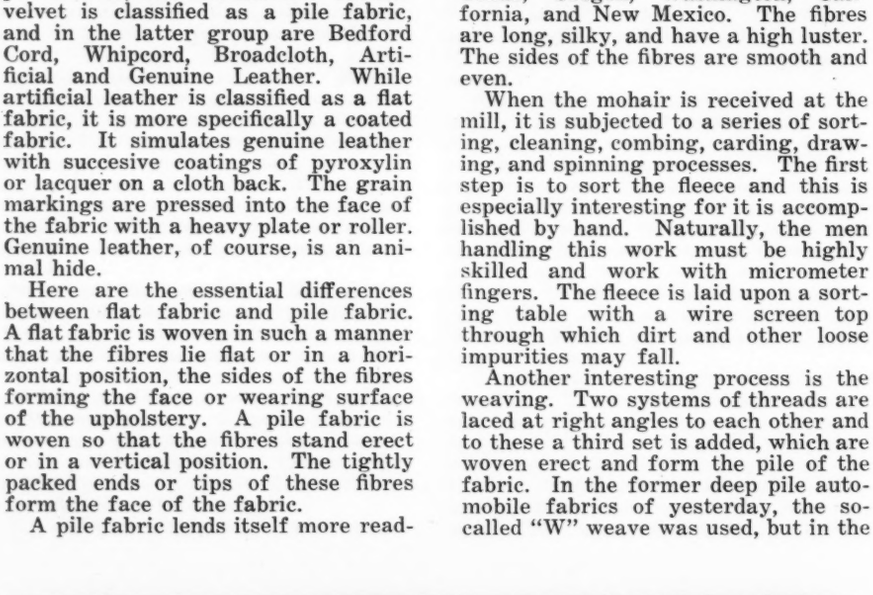
Another interesting process is the weaving. Two systems of threads are laced at right angles to each other and to these a third set is added, which are woven erect and form the pile of the fabric. In the former deep pile automobile fabrics of yesterday, the so-called "W" weave was used, but in the new modern automobile fabric the "V" weave is employed. The latter permits a lower, closer, and denser pile. Practically all commercial types of mohair velvets are woven face to face and then split before leaving the loom. Its almost constant uniformity of pile height is due to improved shearing operations.

After further rigid finishing processes and thorough inspections, the cloth is taken to the dyehouse. Here the cloth is immersed in the dye baths on rotating racks so that an even and uniform dyeing results.

Today, ventilated mohair velvets for the modern automobile have rubber coated backs which serve to lock the fibres in place and thus strengthen them. The fabric, however, is porous and thus air circulates freely in and out through the fabric and riding comfort is assured.



"It has halitosis!"



Here's the finished product—well styled, comfortable, long wearing, easy to clean, easy on clothes and economical. (We're still talking about upholstery).

Sunnen Ring Compressor

The Sunnen Products Co., 7900 Manchester Ave., St. Louis, Mo., has developed a new ring compressor especially designed to overcome many of the troubles previously encountered with tools of this type. Features of the new compressor include a patented lip that prevents flaring out of the top ring when the band is ready to slip off the piston. Also, the tension is evenly distributed over the entire surface of the band. The new compressor can be used either at the top or bottom of the cylinder.

Chrysler Offers Aid

Arrangements are being made by the Chrysler Corp. to cooperate with the Detroit Public Welfare Commission in giving relief to some of its employes who have been on the payroll more than a year. Methods for helping employes will follow regular welfare procedure and will be based on some individual cases.

Trailer Travel Record

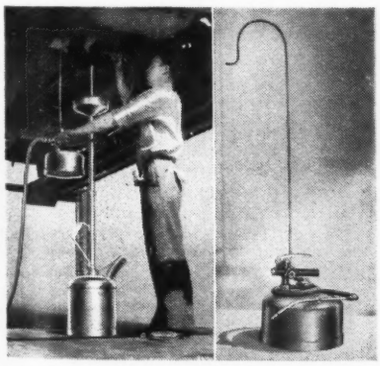
Behind a bicycle, J. Carroll Davis, 21-year old adventurer, pulled a home-made trailer all the way from Tampa, Fla., to Mt. Clemens, Mich., home of Covered Wagon Co., trailer manufacturers, to see how trailers are made under mass production.

Davis started pedaling from Florida on May 28, but did not arrive in Mt. Clemens until Dec. 6. At Chattanooga, Tenn., his trailer was wrecked by a drunken driver and he barely escaped with his life. It took some time to earn enough money to build a new trailer and continue on his trip.

His trailer is a 7 x 3 ft. job, built of Masonite, as a duplicate of a full-sized Covered Wagon. Inside is a bed, a cook stove, and various shelves and storage space—enough room for one slim young man. With him in his travels he carried two small dogs, who rode on a special platform built across the trailer hitch. A unique feature of his trailer as yet not demonstrated by any large trailer manufacturer is a place to carry chickens, thus assuring a supply of fresh eggs on the road. Unfortunately, at one stage in the trip, Davis was obliged to sacrifice his future egg supply in order to sustain the immediate needs of the body.

Hypoid Gear Flusher

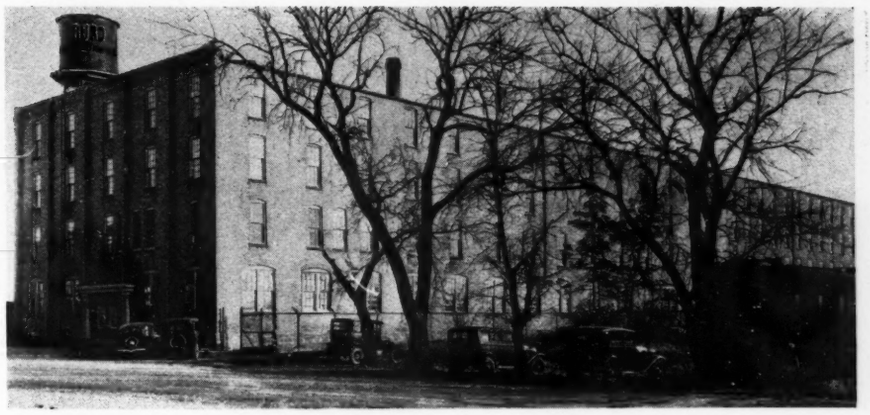
One of the latest products of the Huffman Mfg. Co., Davis and Gilbert Aves., Dayton, Ohio, is their new combination gear flusher and engine cleaner. The gear flusher was designed primarily for cleaning hypoid gears quickly and economically. It operates by air pressure and throws a spray of flushing oil, under pressure, into the differential with such force that grease films are quickly removed.



The gear flusher can also be used as an engine cleaner by using a solution of kerosene and engine cleaning compound which is sprayed, under pressure, on the engine to wash off grease and dirt. It is offered in two models, No. 312, priced at $6.75, and No. 313, priced at $6.95. No. 313 is supplied with a convenient hook for suspending the flusher from the rear axle housing.

Ethyl Corp. Elects Champlin

Ralph C. Champlin has been elected a vice-president of the Ethyl Export Corp., foreign subsidiary of the Ethyl Gasoline Corp. Since joining the Ethyl organization early in 1937, Mr. Champlin has been Chairman of the Coordinating Committee.



New Addition to Burd Plant

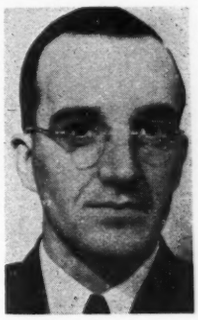
Burd Piston Ring Co. Expands

The Burd Piston Ring Co. of Rockford, Illinois, has purchased an additional factory with 150,000 sq. ft. of floor space. This addition will be used for the manufacture of HaDees car heaters and will double the capacity of the Liberty Foundries Co. Division. Included in the purchase is 5½ acres of land available for further expansion. The new building is four stories high, is completely powered and has its own lighting plant and water system.

According to announcement by F. M. White, president, the company is taking imediate possession and expects to have manufacturing operations under way in the new quarters within two weeks. It is planned to move the general office into the new building. Purpose of the purchase is to take care of greatly increased business, permitting better service to the increasing number of merchandising outlets, and for new developments now in progress.

The greatly increased production facilities will benefit the trade in two ways: (1) It wil provide facilities for more prompt shipments and better service and (2) will permit the company to go ahead with new developments and the production of new items.

Price Appointed by Philco



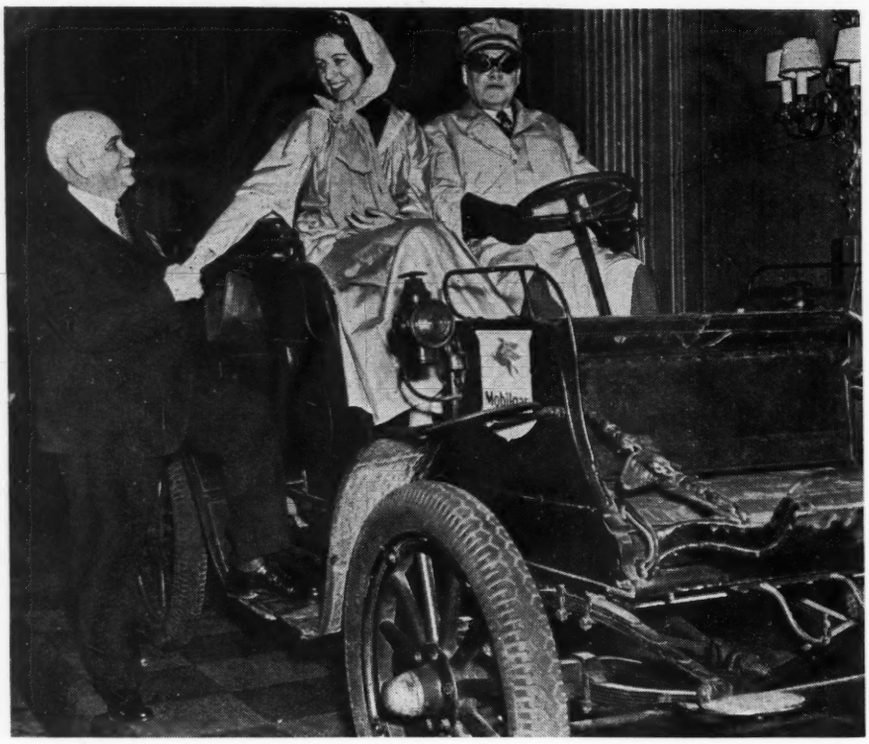
E. B. Price

Edward B. Price has become associated with Transitone Automobile Radio Corporation, Philco's auto radio division, as representative in the Atlantic, eastern and east central divisions covering territories in Pennsylvania, Maryland, Delaware, New York, Ohio, Kentucky, Indiana and West Virginia.

J. W. Dunbar Appointed Assistant to G-E Advertising Manager

J. W. Dunbar, formerly in charge of magazine advertising for the Incandescent Lamp Department of the General Electric Co., at Nela Park, Cleveland, has been appointed assistant to C. H. Lang, advertising manager of the General Electric Co. Mr. Dunbar's headquarters will be at 570 Lexington Avenue, New York City, where he will devote his principal attention to the selection of media.

"I want you to do something about this car—it keeps running into people!"



Thomas P. Henry, president of the A.A.A., greets two daring representatives of early motoring who appeared in a 1902 Haynes at the celebration marking the 35th anniversary of the founding of the American Automobile Association.

Standard Introduces New Line of Jacks

The American Grinder & Specialty Corp., Fond du Lac, Wisconsin, has introduced a complete line of hydraulic jacks known as their "Standard Line" to supplement their well-known line of "Giant Lift" Jacks. The Standard Line is made in the regular and bumper lift styles for passenger cars and in two to 12 ton capacity for trucks. The passenger car line prices range from $3.75 to $6.60.

The complete line of hydraulic jacks, grinders and other products manufactured by the American Grinder & Specialty Corp. is explained in a new catalog recently issued, a copy of which will be sent upon request.

Front Brake Control

The Brake Check Sales Co., 7345 Harvard Avenue, Chicago, Ill., has announced a device for controlling the action of front brakes. It consists of a ball valve which is attached to the frame. Flexible tubing is cut into the brake line and connected to the ball valve. A control wire runs from the valve to the dash to control the operation of the brake check. Pulling the control wire out from the dash tips the valve up and drops a ball check into the seat, thus cutting off the hydraulic pressure to the front brakes, making them inoperative. Pushing the wire in returns the valve to its original position and places front brakes back in operation. List price $16 per set.

"I turn my back for one minute and he's into mischief!"

Diesels Gain in England

The growth in popularity of the Diesel engine in England is evidenced by the fact that 12,500 public service buses equipped with them are in operation there today, compared with only 2400 Diesel-engined buses in operation three years ago, according to a report by the American Consulate General, London, made public by the Department of Commerce.

As a further example of the popularity of the Diesel in England, the report stated that of the total number of new passenger vehicles registered in England this year, 69 per cent were equipped with Diesels.

Diesel truck equipment in England has not kept pace with the passenger vehicles due to the fact that in order to avoid both taxation and speed limit restrictions there, the unladen weight of trucks must not exceed 2½ tons, it was reported. Inasmuch as the weight of the Diesel is much greater than that of the gasoline engine, truck operators do not wish to sacrifice carrying capacity with the added weight of the Diesel, according to the report.

Murray Corp. Appoints Stylist

Count Alexis de Sakhnoffsky, widely known designer of automobiles and many other industrial products, has been engaged as consulting stylist by the Murray Corporation of America, builders of automobile bodies, C. W. Avery, president of the corporation, announced today. Count Sakhnoffsky's activities on behalf of the Murray Corporation will include research in the development of new lines for the motor car of the near future, as well as application of his decorative knowledge to the design of striking instrument boards and interiors.

Sleetex Has New Defroster Blade

A new product of the Sleetex Co., Inc., 404 Fourth Ave., New York City, is their Sleet King defroster blade. This blade requires no replacement of the regular blade, but slides over the top of it. It utilizes the natural action of the rain wiper blade to distribute

its defrosting solution over the entire arc of the wiper. The Sleet King Defroster is supplied with two extra refills, and carries a list price of $0.35 each.

$5,000 Grey-Rock Contest Announced

In celebration of the ever-growing popularity of their name, Grey-Rock, United States Asbestos, Manheim, Pa., will announce an enormous contest next month. One of the largest "inside" contests ever attempted, it will be waged for the best 50 words on the subject "Why Grey-Rock is the fastest growing line." It is not open to the public, but is confined to all men who work with brakes. Thus the $5000, including $1000 first prize, will be divided among those managers, foremen, and mechanics of service stations, car dealers, brake stations, and fleet shops who submit the best 50 words on the subject.

It is anounced that the contest will have no losers, since a premium-prize is to be presented to every-one who enters. Grey-Rock manufactures a full line of friction materials, but is best known for Grey-Rock Balanced Braksets especially engineered replacement linings for individual passenger cars, and Grey-Rock's "two linings and the Guide" for commercial vehicles. No distinction will be made between fleet and passenger car mechanics, but all entries for the several hundred prizes will be judged on their own merit by a group of well-known automotive men.

The contest begins February first and ends June 15th. It will be widely publicized within the trade.

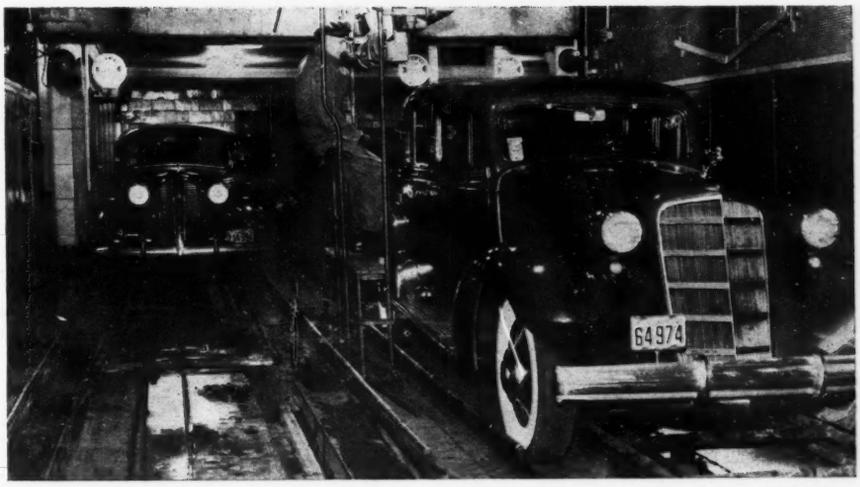
The candid camera caught Frank S. Barks, president of the Lincoln Engineering Co., as he admired a vacation trophy lured from an Oregon lake.

Warner Buys Auburn Plant

Warner Automotive Parts Corp., Auburn, Ind., subsidiary of Borg-Warner Corp., Chicago, has purchased at an unnamed price the entire Auburn Automobile Co. plant at Auburn.

Approximately 300 men will be employed by the new firm which will begin operations in the spring or early summer.

The Auburn Automobile Co., which ceased operations in 1933, retained the administration building for its service department and will employ 40 men. Negotiations by the Warner interests have been going on since last spring, starting with an offer for lease of the premises. Following E. L. Cord's sale of controlling interest in the Cord Corp., the new owners of the plant placed the premises on sale.



Untouched by human hands are the cars parked in the Palmer House Garage, Chicago, said to be the only garage in the world where cars are handled entirely by machinery. The car owner parks his car on a runway, locks it, and takes the keys with him. Electric skids place the car on an elevator which takes it to one of the 25 floors of this building. More electric skids remove the car from the elevator and place it in parking space.

K-D Lamp Holds Annual Convention

The K-D Lamp Co., Cincinnati, O., recently held its annual sales convention, Tuesday, Nov. 30 and Wednesday, Dec. 1.

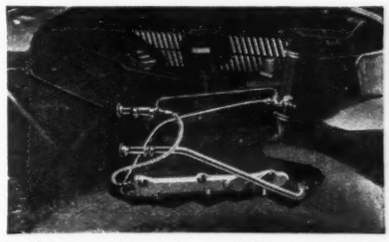
Representatives were present from every part of the country as well as from its export division. The representatives were taken on a visit through the enlarged K-D plant where they had an opportunity to inspect the many improvements instituted by the Production Department and Shipping Department as well as to obtain first hand information as to what the Research Laboratory and Engineering Department are doing.

Trade-Marks

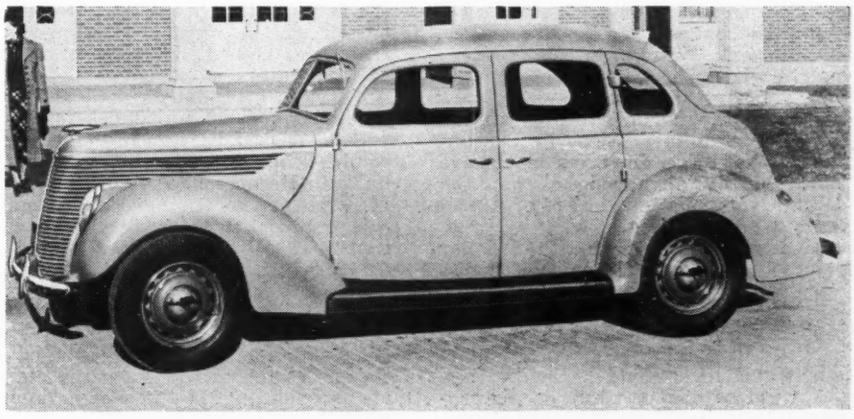
Acheson Colloids Corporation, Port Huron, Michigan, points out that the words "dag," as well as "Oildag," "Aquadag," "Glydag," "Castordag," "Varnodag," and "Prodag," are trademarks, and not generic terms. These names represent their brands of colloidal products in various mediums, and as such are protected by and subject to the usual trade-mark laws.

Steam Conversion Unit For Ford Car Heaters

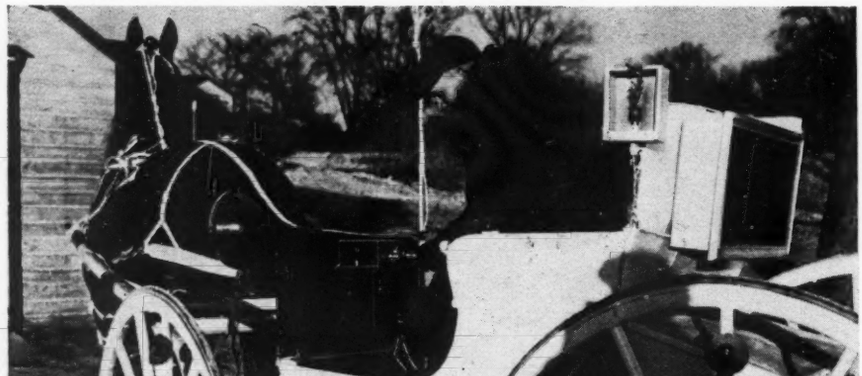
A steam conversion unit for installation on Ford V-8 cars using a hot water heater has been developed by the Bridgeport Thermostat Co., Inc., Bridgeport, Conn. Consisting of a special boiler-type manifold and suitable connections, the water from the



cooling system is quickly converted into steam and forced into the top of the hot water heater, providing adequate heat within two blocks of driving, according to the manufacturer. When the steam is condensed in the heater, it flows back through the regular hose connection to the cooling system. No special tools are required for installation, and no special adjustments are necessary. List price, $9.95.



First full view of the new Ford V-8 which was described in detail in the November Motor Age. Shown above is the standard Fordor sedan. The standard models are available with either the 85 or 60 horsepower V-8 engine.



Good prospect for accessory sales is Frank Dyer of Whitewater, Wis., in spite of the fact that he owns no automobile. On his horse and buggy are harness lights, spoke lights on each wheel, a large tail light with the word "Howdy" painted on it, a horn on the dashboard, spot light, whip socket light, port and starboard lights and a radio with loud speakers (one of which can be seen behind the wheel) mounted on each side of the buggy. Current is furnished by five batteries.

Accurate Parts Clutch Manual

The Accurate Parts Mfg. Co., 12435 Euclid Ave., Cleveland, Ohio, has recently published a new clutch manual. In addition to containing a complete, illustrated section of the causes of clutch troubles and the methods of correction, the manual gives detailed instructions covering the servicing of the popular makes of clutches, and clutch pedal adjustments. Price 50 cents.

New Wells Catalog

The Wells Mfg. Corp., Fond du Lac, Wisconsin, makers of replacement automotive ignition parts, has recently issued a new catalog covering their complete line. The catalog is attractively prepared and clearly indexed, and contains numerous illustrations of the Wells line of coils, condensers, rotors, contact sets, bakelite heads, starter and stop light switches, cutouts, etc.

Joint Research Planned

Leading aluminum cylinder head manufacturers have formulated a joint program of engineering and metallurgic research to correlate progress of automobile engine design and materials in relation to cylinder heads. Announcement has been made of an extensive schedule of laboratory work now being prepared on a co-operative basis by the Aluminum Co. of America, Bohn Aluminum and Brass Corp., Aluminum Industries Inc., Advance Aluminum Castings Corp., National Bronze and Aluminum Foundry Co., and The Permold Co.

The engineering section of the research activities will be devoted to study of the adaptation of the superior thermal qualities of aluminum alloys to present and future automobile engines. The metallurgical section of the program will include an analysis of problems connected with alloys used in cylinder heads, chemical and electrolytic reactions of cooling water in various sections of the country, advantages of various types of gasket materials and other data particularly concerned with circulating systems and various cooling agents.

Laboratories of the Aluminum Co. of America in Cleveland and of the Bohn Aluminum and Brass Corp. of Detroit have been placed at the disposal of the committees. In order to give an accurate cross check of results, practically all of the tests will be duplicated in both these laboratories.

A number of cylinder head designs are already available for test and final results of these investigations, together with the supporting data, will be made available to the automobile industry.

Fourth Quarter Production Only 10% Off Record High

Despite drastic retrenchment in its operating rate during recent weeks, the automobile industry will come through the final quarter of 1937 with an output exceeded only twice before in history, and then only by a small margin. Production in the current three months' period will show only a scant 10 per cent shrinkage from the all-time fourth quarter high established last year and will be off only about 6 per cent from the volume enjoyed in the corresponding period of 1935.

For the industry to do 90 per cent of its peak volume in the current quarter is a creditable showing in view of the state of general business, and the performance is all the more outstanding when it is considered that prices for its product have been sharply advanced so that the dollar volume undoubtedly represents a new all-time high.

Measured either by unit or dollar volume, there is little cause for disappointment in the business done during the current quarter and with the higher price scale in effect there would be little complaint about profit margin if this level could be held. It is the trend of business that is disturbing. That has been steadily downward, and of late, sharply so.

The early start on new models this year permitted heavy shipments to dealers in October with the result that that month showed a gain of 47 per cent over October last year. Then came the automobile shows which signaled more conservative production schedules and November output dropped 7.6 per cent below that of a year ago. With retail delivery reports showing rapidly receding demand, schedules have been forgotten and plants have gone on a day-to day production, governed by dealers orders and the latest reports from the field. Now it looks as if December output will be off at least 36 per cent from the record December total of 518,959 units last year.

There is even danger now that the coveted 5,000,000 unit goal for 1937 will be missed by a scant margin. It would require production of 332,000 units in December to reach this mark. If there are no further curtailments, this goal is still in sight. Production to date this year is estimated at 4,875,000 cars and trucks, leaving 115,000 to go in the remaining two weeks. That would be a relatively easy assignment if the current rate of production could be continued to the end of the month, but many plants are considering a shut-down during the holiday week. In most cases definite decision is yet to be made and on this decision hinges attainment of the 5,000,000 goal for 1937.

Spare time of G. C. Nancarrow, sales manager for Atlas Press Co. of Kalamazoo, Mich., is spent in this fashion. We'd be glad to offer our help, if he needs any.

A.A.A. Elects Johnson

Alex E. Johnson, general agent at Louisville for Continental and National Casualty Companies and local agent for several fire companies, was recently elected a member of the Executive Committee of the American Automobile Association, of which he has been a southern director for some years. He will be southern representative on the Executive Committee.

Engineer Predicts Radical Brake Changes

Elimination of self-energizing action in brakes as a contribution to greater driving safety is predicted for the near future by Ralph K. Super, Chief Engineer, Linderman Devices, Inc.

"Self-energizing action was adopted as a means toward increasing braking power with smaller brakes," Mr. Super points out.

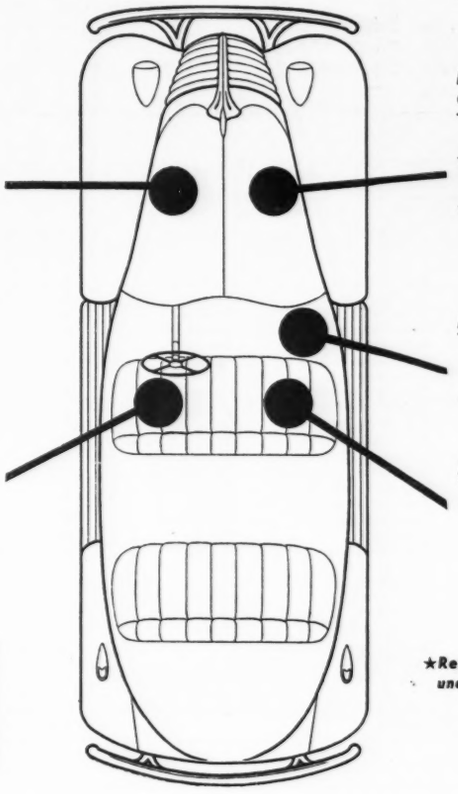
"Unfortunately self-energizing action is not controllable since its amount depends on such variables as clearance between drums and lining, condition of drum, condition of lining, vehicle speed, etc.

"Engineers have gone as far as possible in present brake designs toward increasing safety and have done a remarkably good job under the conditions. The next step, it is now generally agreed among vehicle manufacturers, is the elimination of self-energizing action.

"This will probably bring with it either larger brakes with wider drums to give increased braking capacity, or else capacity will have to be increased within present brake drums by making more effective use of the area available. Today's brake designs even at maximum efficiency utilize only 60 per cent of the available area, and, of course, rarely utilize this maximum fixture except right after adjusting."

Battery Location on the 1938 Models

Reprinted from "Exide News"



Left Engine Compartment

Graham
Hudson
Hudson-Terraplane
Oldsmobile
Pontiac

Left Seat

Chrysler
De Soto
Dodge
Hupmobile
Nash-Lafayette
Packard
Pierce Arrow
Plymouth
Studebaker

Right Engine Compartment

Buick
★Cadillac V-8
Ford
★LaSalle
Lincoln Zephyr
Willys

Right Floor-Boards

American Bantam
Chevrolet
Lincoln

Right Seat

Nash
Cadillac V-16

Always make the hydrometer test BEFORE adding water.

★Remove batteries from under right front fender.

Five New Manley Hydraulic Jacks

Five new jacks have recently been added to the line of garage and service station equipment manufactured by the Manley Manufacturing Division of the American Chain & Cable Co., Inc., York, Pa. These jacks have capacities ranging from 1½ to 5 tons. They are all constructed very low and afford ample clearance for low cars. The height of raise on all jacks is 20 in., with the exception of the 3 and 5 ton jacks which have an exceptionally high raise of 24 in. Illustration is of the No. 953 which is rated as 2-ton capacity.

All jacks are very easy to operate and are completely controlled from the handle. They can be lowered slowly, quickly or stopped at any height. A safety lock pin prevents accidental lowering, while automatic safety valves prevent serious overloading of jacks beyond their rated capacity.

Willys Makes Economy Record

E. G. "Cannon-Ball" Baker established a new economy record in Canada when he recently averaged 46.28 miles per Imperial gallon, driving a stock 1938 Willys sedan from Windsor to Montreal, a distance of 597 miles, according to a report just issued by David R. Wilson, president, Willys-Overland Motors, Inc. The high mileage record, made under adverse weather conditions, is equivalent to 38.56 miles per American gallon.

The test run was made under the official supervision of the Canadian Automobile Association.

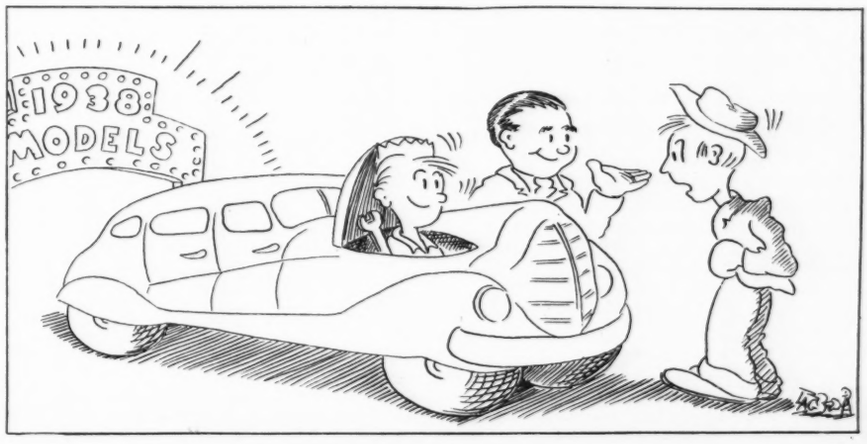
Combination Flash-Lite And Screw Driver

The Stanley Rule & Level Plant of the Stanley Works, New Britain, Conn., has introduced a new pocket flash-lite screw driver designed for use for automotive and radio work.

The tool is supplied with a clip and uses one standard battery and light bulb. The screw driver blade is two inches long and ⅛ in. in diameter and is made of tempered steel, with an accurate machine cross-ground tip. List price—$1.

Las-Stik Heat Gun Announced

A new electrically operated heat gun has been announced by the Las-Stik Mfg. Co., Hamilton, Ohio. The gun operates from either AC or DC current and contains a 500-watt heating unit and is said to reach a temperature of 400 deg. in less than two minutes. It operates from any 110-volt circuit and when connected to the air line may be used for thoroughly flushing differentials or transmissions, thawing frozen radiators and water pumps, drying spark plugs, distributor and ignition wires, quick drying of touch-up and paint jobs or any other uses for which external heating is desired. Dealer's price, $7.50.



"It comes with mechanic installed as optional equipment!"

The Green Flag

(*Continued from page* 14)

most prominently, at Detroit and in the New York sector and on the west coast, the owners say they are not yet ready to display their new mounts.

One thing is certain. A number of the present cars, which have campaigned the speed trails for some years past and have often been "remolded" to suit the rules' mandates, will again undergo revisions. Too, there will be brand new mounts conforming, from the chassis to the hood, to the pattern of the new International Formula. All of which will cost the American car owners a sum which, to estimate, would result in unreliable guess-work.

It is safe to assume that among those withholding plans at present and who will shove new mounts onto Indianapolis early in the year for tryout in the strictest letter of the new formula will be the Joe Thornes, the Mike Boyles, the Wilbur Shaws, the Robert Bowes, the Lee Oldfields, the Harry Hartzs, the Phil Shafers, the "Deacon" Litzs, and other reliables known for their financial investments toward racing's progress.

Among other points in favor of the International Formula is assurance that the same set of rules will be in effect at least three years, 1938, 1939 and 1940. And, if successful, it is not impossible that the same set of rules will continue. Back in 1932, the International Sports Commission drew up a three-year set of rules which is currently being replaced by the new formula.

That group of specifications, which had its beginning in 1934 (the International Commission always works at least two years in advance of innovations) was continued during 1937—a year beyond the 1936 scheduled closing.

Entry blanks for the twenty-sixth International 500-Mile Sweepstakes at Indianapolis, next May 30, officially place America's brick oval in favor of the new rules and pave the way for an influx of Europeans for the historic classic.

Existing rules have been thrown into discard and a completely revised entry form has been issued to championship contenders of the United States and Europe.

No longer will drivers be gripped by the fear of "running out of fuel" within the sight of victory—for the unpopular limit on the amount of gasoline allowed for the 500 miles has been removed; drivers also may select any type of fuel, using their own formula to add that extra "ping"—for there no longer is a rule requiring use of stock fuel "which may be purchased by the motorist at the corner service station."

No longer will drivers be required to add lead to their chassis to come up to the 1,800-pound minimum weight, even on the smaller cars—for the new rules establish weights in line with the car's piston displacement.

No longer will drivers be "forced" into a greater number of pit stops than they feel capable of eliminating—for the new rules discard any limit in the size of the fuel-tank allowed on any car. Under the now-retired rule which restricted the size to fifteen-gallon capacity, a driver could not possibly go through the 500 miles at Indianapolis without several pit stops for gasoline alone. The technical committee has now become "soft-hearted" and "recommends" that drivers do not construct tanks "for a capacity exceeding thirty gallons"—but if the driver wishes to surround himself with gasoline tank capacity, that now comes under the head of his individual business.

(*Continued on page* 46)

DISPLACEMENTS AND RESULTS AT INDIANAPOLIS

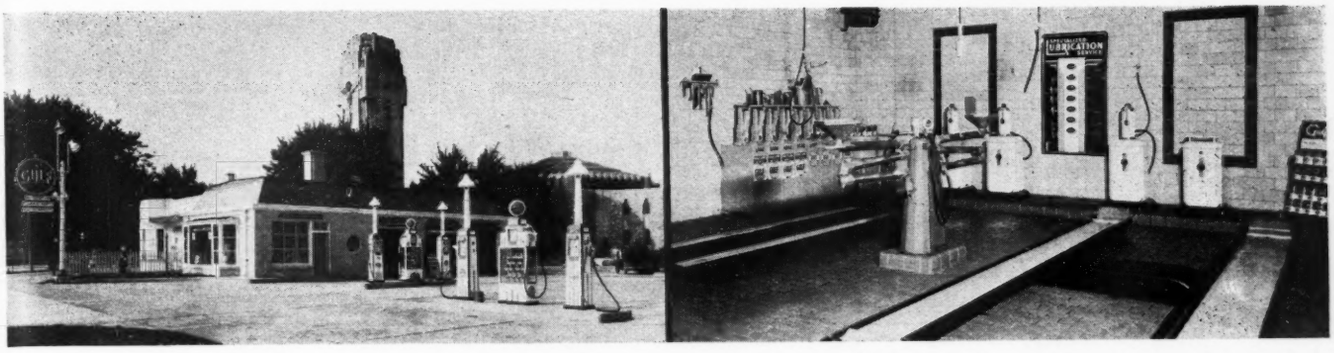
Year	Allowed Max. Displ. Cu. In.	Winner	Car	Cylinder	Displacement	M.P.H.
1911	600	Ray Harroun	Marmon	6	447.1	74.59
1912	600	Joe Dawson	National	4	490.8	78.7
1913	450	Jules Goux	Peugeot	4	448.13	76.92
1914	450	Rene Thomas	Delage	4	389.2	82.47
1915	300	Ralph De Palma	Mercedes	4	274	89.84
1916*	300	Dario Resta	Peugeot	4	274	83.26
1917 and 1918—War years, no race held.						
1919	300	"Howdy" Wilcox	Peugeot	4	274.6	88.06
1920	183	Gaston Chevrolet	Monroe	4	182.5	88.50
1921	183	Tommy Milton	Frontenac	8	182.5	89.62
1922	183	Jimmy Murphy	Murphy Special	8	181.44	94.48
1923	122	Tommy Milton	Duesenberg	8	120.75	90.95
1924	122	L. L. Corum and Joe Boyer	Duesenberg	8	121.9	98.23
1925	122	Pete De Paolo	Duesenberg	8	121.780	101.13
1926**	91.5	Frank Lockhart	Miller	8	90.2	95.885
1927	91.5	Geo. Souders	Duesenberg	8	90	97.54
1928	91.5	Lou Meyer	Miller	8	90.2	99.482
1929	91.5	Ray Keech	Miller	8	90.2	97.585
1930	366	Billy Arnold	Miller	8	151.5	100.448
1931	366	Lou Schneider	Miller	8	151.0	96.629
1932	366	Fred Frame	Miller	8	182	104.144
1933	366	Lou Meyer	Miller	8	258	104.162
1934	366	Bill Cummings	Miller	4	220	104.863
1935	366	Kelly Petillo	Miller	4	262	106.240
1936	366	Lou Meyer	Miller	—	—	109.069
1937	366	Wilbur Shaw	Offenhauser	4	255	113.580

*—300 Miles—The only year (1916) that the Indianapolis Speedway's Sweepstakes was scheduled for less than 500 miles.
**—400 Miles—Called because of rain. The only year (1926) that rain has halted the Indianapolis race.

DISPLACEMENTS AND CORRESPONDING WEIGHTS OF RACE CARS INTERNATIONAL RACING FORMULA 1938-39-40

Piston Displacement		Supercharged Minimum Weight*		Non-Supercharged Minimum Weight**	
Cu. In.	C.C.	Lb.	Kgs.	Lb.	Kgs.
40.639	666	881.840	400.000	.....	.....
42.714	700	896.291	406.555	.....	.....
48.816	800	938.795	425.835	.....	.....
54.918	900	981.300	445.115	.....	.....
61.020	1,000	1,023.805	464.395	881.840	400.000
67.122	1,100	1,066.309	483.675	910.169	412.850
73.224	1,200	1,108.814	502.955	938.498	425.700
79.326	1,300	1,151.319	522.235	966.827	438.550
85.428	1,400	1,193.823	541.515	995.156	451.400
91.530	1,500	1,236.328	560.795	1,023.485	464.250
97.632	1,600	1,278.833	580.075	1,051.814	477.100
103.734	1 700	1,321.338	599.355	1,080.143	489.950
109.836	1,800	1,363.842	618.635	1,108.472	502.800
115.938	1,900	1,406.347	637.915	1,136.801	515.650
122.040	2,000	1,448.852	657.195	1,165.131	528.500
128.142	2,100	1,491.356	676.475	1,193.460	541.350
134.244	2,200	1,533.861	695.755	1,221.789	554.200
140.346	2,300	1,576.366	715.035	1,250.118	567.050
146.448	2,400	1,618.870	734.315	1,278.447	579.900
152.550	2,500	1,661.375	753.595	1,306.776	592.750
158.652	2,600	1,703.880	772.875	1,335.105	605.600
164.754	2,700	1,746.384	792.155	1,363.434	618.450
170.856	2,800	1,788.889	811.435	1,391.763	631.300
176.958	2,900	1,831.394	830.715	1,420.093	644.150
183.060	3,000	1,873.898	849.995	1,448.422	657.000
189.162	3,100	.....	.....	1,476.751	669.850
195.264	3,200	.....	.....	1,505.080	682.700
201.366	3,300	.....	.....	1,553.409	695.550
207.468	3,400	.....	.....	1,561.738	708.400
213.570	3,500	.....	.....	1,590.067	721.250
219.672	3,600	.....	.....	1,618.396	734.100
225.774	3,700	.....	.....	1,646.725	746.950
231.876	3,800	.....	.....	1,675.055	759.800
237.978	3,900	.....	.....	1,703,384	772.650
244.080	4,000	.....	.....	1,731.713	785.500
250.182	4,100	.....	.....	1,760.042	798.350
256.284	4,200	.....	.....	1,788.371	811.200
262.386	4,300	.....	.....	1,816.700	824.050
268.488	4 400	.....	.....	1,845.029	836.900
274.590	4,500	.....	.....	1,873.358	849.750

*—Increasing by 1.9280 kgs. (4.25 lb.) for each increase of 10 cc. (0.61 cu. in.) of displacement.
**—Increasing by 1.285 kgs. (2.63) lb. for each increase of 10 cc. (0.61) cu. in. of displacement.



Located directly across the street from Father Coughlin's renowned Shrine of the Little Flower, the service outlet of Robert Antwis is a fine example of the manner in which appearance can be made to complement an attractive neighborhood. The attractiveness of this location is not only in its exterior, as may be seen in the above photograph.

Seven New Hudsons

Seven 1938 business cars have been announced by the Hudson Motor Car Co. The new models include a utility coach, utility coupe, custom panel delivery, cab pick-up, taxicab, station wagon, and chassis with cab. All are mounted on the six-cylinder Hudson Terraplane chassis and provided in optional gear ratios for adaptation to any commercial purpose within capacity. The 96-hp. engine is standard equipment, with 102 hp. available as an option through the use of a high-compression engine having an aluminum "super power dome" cylinder head.

The utility coach is mounted on a 117-in. wheelbase and has a capacity of 1000 lb. The right-hand front seat and the rear seat are removable and the car can be loaded from the side and rear through the baggage compartment door. Width at the belt is 58½ in., and at the floor, 53 in. The rear load door is 29 by 44 in. A single space over 10 ft. long is available with rear seat and right front seat removed.

Exterior appearance of the utility coupe is the same as a regular passenger coupe. However, when the rear baggage door is lifted, a steel pick-up box body can be rolled out at the back of the car to provide a loading space 49¼ by 38 in. wide and 11⅝ in. deep. It is adjustable to three positions and has a tail gate. Wheelbase of this chassis is 117 in.

Two wheelbases, 117-in. and 124-in. are available for the custom panel delivery model. Capacity of this car is 1500 lb.

The cab pick-up is also offered with 117-in. and 124-in. wheelbases. The transmission for this unit has been made stronger to withstand especially severe road conditions. Steel lockers are supplied on this model which extend from the front to the rear on both sides. With the locker boxes removed, the pick-up has 47½ cu. ft. carrying capacity.

The taxicab is mounted on either the 117-in. or the 124-in. wheelbase. The larger size gives an extra 7 in. of length in the passenger compartment without reducing the room in the driver's compartment.

Hudson also supplies a chassis and cab unit on either the 117- or 124-in. wheelbase, permitting special body mounting. On the 1938 unit, heavier gage material is used for the frame, and the rear cross member is gusseted to the side rails.

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ANTI-FREEZE

— A tremendous success in the '37-'38 season! ARTIC Free-Flow is a high quality, permanent anti-freeze — thoroughly tested to assure superb performance. Gives perfect protection winter or summer . . . lasts from year to year. 50-50 mixture gives protection to 32° below zero. Retails at $2.95 per gallon. Packed in one gallon containers — six to a case. ARTIC offers great possibilities to distributors and dealers.

FACTS ABOUT ARTIC Free-Flow ANTI-FREEZE

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GENTLEMEN: Without obligation, please send full information about ARTIC Free-Flow ANTI-FREEZE.

NAME_____

ADDRESS_____

CITY_____ STATE_____

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE															CHASSIS						
					No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension	Service Brake Make and Type
1	Bantam.....60	439	75	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	....	Al	Gear	Als	No	No	Til	Buf	A	Wil	P.Ro	WG	Nb-UP	½ Spi	5.87	Tr	OM
2	Buick.....38-40	1022	122	6.50/16	8-3⅜x4½	30.6	248.0	107-3400	6.15	38.8	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spl	½ Own	4.40	IC	OH
3	Buick.....38-60	1272	126	7.00/15	8-3⅛x4⅛	37.8	320.2	141-3600	6.35	42.3	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	3.90	IC	OH
4	Buick.....38-80	1645	133	7.00/16	8-3⅛x4⅛	37.8	320.2	141-3600	6.35	39.3	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.18	IC	OH
5	Buick.....38-90	2176	140	7.50/16	8-3⅛x4⅛	37.8	320.2	141-3600	6.35	38.6	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.55	IC	OH
6	CadillacV8-38-60-60S	2085	127	7.00/16	8-3½x4½	39.2	346.0	135-3400	6.25	....	CI	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC	BH
7	Cadillac....V8-38-65	2285	132	7.50/16	8-3½x4½	39.2	346.0	135-3400	6.25	42.8	CI	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC	BH
8	Cadillac....V8-38-75	3075	141	7.50/16	8-3½x4½	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ala	No	AC	Str	Wal	D	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC	BH
9	Cadillac-V-16...38-90	5135	141	7.50/16	16-3¼x3½	67.6	431.0	185-3600	7.00	....	CI	Mor	Ala	Fram	AC	Car	Wal	D	D	P.Long	Own	Nb-Mec	½ Own	4.31	IC	BH
10	Chevrolet.HB Master	730	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	35.7	CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	3.72	C	OH
11	Chevrolet...HA DeL.	796	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	39.7	CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	4.22	IC	OH
12	Chrysler...Roy. C-18	998	119	6.25/16	6-3⅜x4½	27.3	241.5	95-3600	6.20	39.3	CI°	Mor	Ala	Pur	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC	LH
13	Chrysler...Imp. C-19	1198	125	6.50/16	8-3¼x4½	33.8	298.6	110-3400	6.20	39.5	CI°	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	½ Own	3.91	IC	LH
14	Chrysler.Cus.Im.C-20	2295	144	7.50/16	8-3¼x4⅞	33.8	323.5	130-3400	6.50	....	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	½ Own	4.55	IC	LH
15	De Soto.....S-5	958	119	6.00/16	6-3⅜x4¼	27.3	228.1	93-3600	6.50	37.8	CI°	Mor	Ala	Pur	AC	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC	LH
16	Dodge.....Six	898	115	6.00/16	6-3¼x4⅜	25.3	217.8	87-3600	6.50	38.0	CI	Mor	Als	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C	LH
17	Ford.....V8-60	685‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-4200	6.60	....	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.....	Own	m-Spi	¾ Own	4.44	Tr	OM
18	Ford.....V8-85	710‡	112	6.00/16	8-3⅛x3¾	30.0	221.0	85-3800	6.12	....	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr	OM
19	Graham...Std., Spec.	1065	120	6.25/16	6-3¼x4⅜	25.3	217.8	90-3600	6.70	....	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C	OH
20	Graham.S.c.,Cus.S.C.	1290	120	6.25/16	6-3¼x4⅜	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C	OH
21	Hudson-Terrapl...81	864	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	37.3	CI	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	Rs	BH
22	Hudson-Terrapl...82	915	117	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.6	CI	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	Rs	BH
23	Hudson, 6.....83	984	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	35.9	CI	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	Rs	HM
24	Hudson....8, 84, 5, 7	1060	122, 129	6.50/16	8-3x4½	28.8	254.5	122-4200	6.25	40.4	CI	GED	Al	No	AC	Car	Old	A	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	Rs	HM
25	Hupmobile Six.....E	1045	122	6.25 16	6 3½x4½	29.4	245.3	101-3600	5.75	42.2	CI	Mor	Als	No	AC	Car	Old	A	Wil	P.B&B	WG	Nb-Spi	½ Spi	4.54	C	H
26	Hupmobile Eight...H	1325	125	6.50 16	8-3⅛x4¾	32.5	303.2	120-3600	5.80	44.5	CI	Mor	Als	No	AC	Car	Old	A	Wil	P.Long	WG	Nb-UP	½ Spi	4.54	C	H
27	La Salle....V8, 38-50	1380	124	7.00/16	8-3⅜x4½	36.4	322.0	125-3400	6.25	40.7	CI	Mor	Ala	No	AC	Car	Wal	D	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC	BH
28	Lincoln.....V12	(i)‡	136-145	7.50/17	12-3⅛x4½	46.8	414.0	150- 400	6.38	....	Al	Ch	Al	Pur	AC	Str	Own	A	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C	OM
29	Lincoln-Zephyr.....	1375‡	125	7.00/16	12-2¾x3¾	36.3	267.0	110-3900	6.70	....	Al	Gear	CS	Fram	....	CS	Own	O	Own	P.....	Own	m-Spi	¾ Own	4.44	Tr	OM
30	Nash Lafay....3810	850	117	6.00/16	6-3⅜x4⅜	27.3	234.8	95-3400	5.83	38.4	CI	Whit	Als	No	AC	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	½ Own	4.11	C	BH
31	Nash...Amb. 6, 3820	1050	121	6.25/16	6-3⅜x4⅜	27.3	234.8	105-3400	6.00	....	CI	Whit	Als	BS	AC	Mar	Wal	A	USL	P.B&B	Own	Nb-Mec	½ Own	4.11	C	BH
32	Nash...Amb. 8, 3880	1200	125	7.00/16	8-3⅛x4¼	31.2	260.8	115-3400	6.00	....	CI	Dia	Als	BS	Bur	Str	Wal	A	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C	BH
33	Oldsmobile.....38	967	117	6.50/16	6-3 7/16x4⅛	28.4	229.7	95-3400	6.10	38.4	CI	Whit	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC	BH
34	Oldsmobile.....38	1078	124	7.00/16	8-3¼x3⅞	33.8	257.1	110-3600	6.20	41.7	CI	LB	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC	BH
35	Packard Six....1600	1175	122	6.50/16	6-3½x4¼	29.4	245.3	100-3600	6.52	40.0	CI	Mor	Als	Pur	AC	CG	Old	D	Wil	P.Long	Own	Nb-Mec	½ Own	4.54	IC	H
36	Packard Eight.1601, 2	1325	127, 48	7.00/16	8-3¼x4¼	33.8	282.0	120-3800	6.60	41.4	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-UP	½ Own	(b)	IC	H
37	Pack. Sup. 8 1603,4,5	2790	127-34-39	7.50/16	8-3⅜x5	32.5	320.0	130-3200	6.50	41.6	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-UP	½ Own	4.69	IC	H
38	Pack. Twelve.1607, 8	4155	134, 39	8.25/16	12-3 7/16x4¼	56.7	473.0	175-3200	6.40	45.3	Al	Mor	Als	Pur	AC	Str	Old	A	PD	P.Long	Own	Nb-UP	½ Own	4.41	IC	BPH
39	Pierce-Arrow...1801	3375	138-147	(g)	8-3½x5	39.2	385.0	150-3400	6.40	37.6	Al	Whit	Ala	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C	Ste
40	Pierce-Arrow...1802	3895	138-144	7.50/17	12-3½x4	58.8	462.0	185-3400	6.40	42.0	Al	Whit	Ala	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C	Ste
41	Pierce-Arrow...1803	5015	147	7.50/17	12-3½x4	58.8	462.0	185-3400	6.40	40.7	Al	Whit	Ala	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C	Ste
42	Plymouth.....P5	730	112	5.50/16	6-3' x4⅜	23.4	201.3	82-3600	6.70	36.6	CI°	Mor	Ala	No	BA	BC	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	3.90	C	LH
43	Plymouth.....P6	803	112	6.00/16	6-3⅛x4⅜	23.4	201.3	82-3600	6.70	36.2	CI°	Mor	Ala	Pur	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C	LH
44	Pontiac 6...38-26DA	916	117	6.00/16	6-3 7/16x4	28.3	222.7	85-3520	6.20	37.4	CI	Mor	CHI	No	AC	Car	BH	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC	HM
45	Pontiac 8...38-28DA	980	122	6.50/16	8-3¼x3¾	33.8	248.9	100-3700	6.20	40.0	CI	Mor	CHI	No	AC	Car	Buf	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC	HM
46	Stude. Six & Com....	965	116½	6.00/16	6-3 1/16x4⅜	26.3	226.0	90-3400	6.00	41.2	CI	Dia	Ly	Fram	AC	Str	Buf	A	Wil	P.B&B	WG	Ru-Th	½ Spi	4.55	IT	LH
47	Studebaker. Pres. 4C	1195	122	6.50/16	8-3 1/16x4¼	30.0	250.4	110-3600	6.00	41.6	CI	Dia	Ly	Fram	AC	Str	Bur	D	Wil	P.Long	WG	Nb-Spi	½ Spi	4.55	IT	LH
48	Willys.....38	573	100	5.50/16	4-3⅛x4⅜	15.6	134.2	48-3200	5.70	31.6	CI°	LB	CI	F-O	AC	Til	Buf	A	USL	P.R-B	WG	m-UP	½ Own	4.30	C	BM

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.
(a)—(−¼ to +½)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced
Al—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic
(b)—4.36-1601; 4.70-1602
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—1−⅛, 1−3/32
C—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron **CS**—Cast Steel
(e)—0+1/16−0
(f)—1/16+1/16−0
F—Floating (Piston Pin)
FF—Full floating
(g)—138 in.-7.00/17; 147 in.-7.50/17
H—Hot (tappet clearanec)
(i)—4900-5100 **IC**—Independent coil
IT—Independent Transverse
Ly—Lynite
m—Metal
M—Mechanical
N—Negative
Nb—Needle bearing
P—Piston (Pin Locked in)
P—Single plate clutch
PH—Power operated, hydraulic brakes **R**—Rod (Pin locked in)
RS—Radial Safety Control
(r)—Out only **Ru**—Rubber
TC—Top Center
Tr—Transverse
Var—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS: No. and Width Comp.	RINGS: No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES: Head Diameter and Seat Angle: Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance: Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C.: No. of Degrees	No. of Flywheel Teeth	IGNITION: Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing: Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE: Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OM	La	90	Ch-6	2–3/32	1–1/8	39/64	R	1 3/32	30	1 1/32	30	.279	.006	.006	.006	19B	.....	.022	.025	2 1/32B	1B	Au	A	1 1/16	1 1/4	1 1/2	7	5	1/2	0° 9′	1 1/2	1
OH	S	126x	AC-46	2(c)	2–3/16	13/16	R	1 17/32	45	1 11/32	45	.372	.015H	.015H	††	13B	51/4B	.015	.025	4B	1 5/4B	Au	A	2	1.21	6	13 1/4	N 1/4 ± 2/3	-1/4, +1	0–1/16	3 1/2–4 1/2	2
OH	S	130x	AC-46	2(c)	2–3/16	7/8	R	1 5/8	45	1 11/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2.6B	Au	A	2 1/4	1.31	8	17	N 1/4 ± 2/3	-1/4, +1	0–1/16	3 1/2–4 1/2	3
OH	S	130x	AC-46	2(c)	2–3/16	7/8	R	1 5/8	45	1 11/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2.6B	Au	A	2 1/4	1.31	8	17	N 1/4 ± 2/3	-1/4, +1	0–1/16	4–5	4
OH	S	130x	AC-46	2(c)	2–3/16	7/8	R	1 5/8	45	1 11/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2.6B	Au	A	2 1/4	1.31	8	17	N 1/4 ± 2/3	-1/4, +1	0–1/16	4–5	5
BH	S	155	AC-45	2–1/8	2–3/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Ad	A	2.46	2 3/32	7	24	N 3/4–0	1/4–1	1/32–3/32	4° 51′	6
BH	S	155	AC-45	2–1/8	2–3/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Ad	A	2.46	2 3/32	7	25	0–± 1/4	0–1/2	1/32–3/32	5° 38′	7
BH	S	170	AC-45	2–1/8	2–3/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	3B	Ad	A	2.46	2 3/32	7	25	0–± 1/4	0–1/2	1/32–3/32	5° 38′	8
BH	S	180	AC-45	2(c)	1–1/16	1/16	R	1.50	45	1.37	45	.341	AA	AA	AA	8B	.....	.015	.027	6B	1/4B	Ad	A	2	1 3/4	11	30	0–± 1/4	0–1/2	1/32–3/32	5° 38′	9
OH	O	.....	AC-46	2–1/8	1–3/16	.865	R	1 13/32	30	1 13/32	30	.341	.006H	.013H	.006	9B	3 1/2B	.018	.040	5B	2B	Au	A	2 5/16	1 1/2	5	14	1 3/4–2 3/4	1/2–1 1/2	5/64–1/8	7° 10′	10
OH	O	.....	AC-46	2–1/8	1–1/16	.865	R	1 13/32	30	1 13/32	30	.341	.006H	.013H	.006	9B	3 1/2B	.018	.040	5B	2B	Au	A	2 1/16	1 1/2	5	14	.....	.....	.....	.....	11
LH	G	145x	Ch-J-8	2–1/8	2–5/32	55/64	F	1 23/32	45	1 17/32	45	.340	.008H	.010H	.014	8B	3 1/4B	.020	.025	TC	TC	Au	A	2 1/8	1 7/32	5	20	1/2–2 1/2	(a)	0–1/8	4 3/4–6	12
LH	G	145x	Ch-J-8	2–1/8	2–5/32	55/64	F	1 23/32	45	1 13/32	45	.340	.006H	.010H	.011	2B	3/4B	.018	.025	3B	1 1/4B	Au	A	2 3/16	1 1/8	6	20	1/2–2 1/2	(a)	0–1/8	4 3/4–6	13
LH	G	155x	Ch-H-10	2–1/8	2–5/32	55/64	F	1 23/32	45	1 13/32	45	.340	.006H	.010H	.011	2B	3/4B	.018	.025	TC	TC	Au	A	2 3/16	1 1/8	6	20	1–3	(a)	0–1/8	4 3/4–6	14
LH	G	145x	A-A-7	2–1/8	2–5/32	55/64	F	1 23/32	45	1 13/32	45	.340	.008H	.010H	.014	8B	3 1/4B	.020	.025	TC	TC	Au	A	2 1/8	1 7/32	5	20	1/2–2 1/2	(a)	0–1/8	4 3/4–6	15
LH	O	140x	Ch-J-8	2–1/8	2–5/32	55/64	F	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	4A	1 1/2A	Au	A	2 1/16	1	5	15	1–3	1/4–3/4	0–1/8	4 1/2–5 1/2	16
OM	O	150y	Ch-H-10	2–3/32	1–5/32	.687	F	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2B	.....	.015	.025	4B	.....	Au	..	1.60	1.54	4	15.2	8	1	1/16–1/8	8	17
OM	O	100	Ch-7	2–3/32	1–5/32	.750	F	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	9 1/2B	3B	.015	.025	4B	1 1/4B	Au	A	2	1 13/16	5	22	8	1	1/16–1/8	8	18
OH	R	160x	Ch-J-9	2–3/32	1–7/16 1–5/32	13/16	R	1 23/64	30	1 21/64	45	9/16	.010H	.010H	.012	4 1/2B	1 1/2B	.018	.025	4B	.....	.....	A	2 1/16	1 1/16	5	15	3–4	1	1/8–3/16	7 1/2	19
OH	R	120	Ch-J-9	2–3/32	1–7/16 1–5/32	13/16	R	1 23/64	30	1 21/64	45	9/16	.010H	.010H	.012	4 1/2B	1 1/2B	.018	.025	4B	.....	.....	A	2 1/16	1 1/16	5	15 1/2	3–4	1	1/8–3/16	7 1/2	20
BH	G	80	Ch-J-8-A	2–3/32	2–3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.008	.010	....	10 2/3B	4B	.020	.032	TC	TC	...	A	1 11/16	1.39	5	12 1/2	2–3	1–1 1/2	0–1/8	7	21
BH	G	80	Ch-J-8-A	2–3/32	2–3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.008	.010	.010	10 2/3B	4B	.020	.032	TC	TC	Au	A	1 11/16	1.39	5	12 1/2	2–3	1–1 1/2	0–1/8	7	22
HM	G	80	Ch-J-8-A	2–3/32	2–3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.008	.010	....	10 2/3B	4B	.020	.032	TC	TC	Au	A	1 11/16	1.39	5	12 1/2	2–3	1–1 1/2	0–1/8	7	23
HM	G	....	Ch-J-8-A	2–3/32	2–1/16	3/4	F	1 1/2	45	1 3/8	45	11/32	.008	.010	....	10 2/3B	4B	.017	.032	TC	TC	Au	A	1 11/16	1 3/4	7	17 1/2	2–3	1–1 1/2	0–1/8	7	24
H	G	....	Ch-7	2–1/8	2–5/32	7/8	...	1 21/32	45	1 11/32	45	.341	.010	.013	....	2B	.....	.022	.027	7B	.....	Au	A	2 1/8	1 1/4	6	18	1 1/2	1	1/16–3/16	8 1/2	25
H	G	....	Ch-7	2–1/8	2–5/32	7/8	...	1 3/4	45	1 13/32	45	.341	.006	.013	.010	1A	.....	.015	.027	7B	.....	Au	B	2 1/4	1 1/4	8	21.5	1 1/2	1 1/4	1/16–1/16	7 1/2	26
BH	S	155x	AC-45	2–1/8	2–5/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Ad	A	2 13/32	2 3/32	7	25	N 3/4–0	1/4–1	1/32–3/32	4° 51′	27
OM	O	105	Ch-7	2–1/8	2–5/32	7/8	F	1 11/32	45	1 11/32	45	5/16	AA	AA	AA	21B	6 3/4B	.020	.029	7B	2 1/4B	Au	B	2 1/2	2	12	32	1 1/2	1	1/16–1/8	7 1/2	28
OM	O	105	Ch-H-10	2–3/32	1–3/32	3/4	F	1.54	45	1.54	45	.311	AA	AA	AA	19 1/2B	6 1/4B	.015	.029	4B	1 1/4B	Au	A	2 1/8	1.57	5	30	4	3/4	3/16	4	29
BH	G	110	A-B-7	2–1/8	2–5/32	7/8	F	1 21/32	45	1 13/32	45	.340	.015	.015	.015	.....	.....	.022	.025	4A	.....	Au	A	2	1.42	6	20	1 1/2	1 1/2	0	7	30
BH	G	125	AC-45	2–1/8	2–5/32	7/8	F	1 3/4	45	1 13/32	45	.372	.008H	.015H	.008H	.....	.....	.020	.025	4Bm	1 1/4B	Au	A	2	1.42	7	20	1 1/2	1 1/2	0	7	31
BH	G	125	AC-45	2–1/8	1–1/8 1–3/8	7/8	F	1 21/32	45	1 13/32	45	.375	.015H	.015H	015H	.....	.....	.020	.025	9Bm	2 1/2B	Au	B	2	1.24	7	18	1 1/2	1 1/2	0	7	32
BH	S	146x	AC-45	2–1/16	2–3/16	55/64	P	1 9/16	30	1 27/64	45	11/32	.008H	.011	(k)	5B	2B	.020	.040	TC	TC	Au	A	2 1/16	1 3/4	6	17	0–N 3/4	1/6–1	1/6–3/16	4° 51 1/2′	33
BH	S	152x	AC-45	2–1/8	2–1/16	55/64	P	1 1/16	30	1 27/64	45	11/32	.008H	.011	(n)	TC	TC	.015	.030	2B	3/4B	Au	A	2 1/16	1 3/8	7	21	0–N 3/4	1/8–1	1/8–3/16	4° 51 1/2′	34
H	O	110	AC-103 (z)	2–1/8	1–3/16	7/8	F	1.57	30	1 13/32	45	.340	.007H	.010H	....	1B	.....	.020	.028	6B	1 1/2B	Au	A	2 3/32	1 1/4	6	15	1 1/2 ± 1/2	1/2 ± 1/2	(e)	1° 54′	35
H	O	110	AC-103 (z)	2–1/8	1–3/16	7/8	F	1 13/32	30	1 13/32	45	.340	.007H	.010H	....	1B	.....	.015	.028	8B	2 3/4B	Au	A	2 3/32	1 1/4	6	16	1 1/2 ± 1/2	1/2 ± 1/2	(e)	1° 54′	36
H	O	110	AC-103 (z)	2–1/8	2–5/32	7/8	F	1 13/32	45	1 13/32	45	.340	.006H	.008H	....	30B	9 3/4B	.015	.028	6B	2 1/4B	Au	B	2 1/16	1 3/8	8	20	2 1/2 ± 1/2	1 ± 1/4	(f)	1 1/2	37
BPH	O	110	AC-103 (z)	3–1/16	1–5/32	7/8	F	1 11/64	45	1 21/64	45	.340	AA	AA	....	TC	TC	.020	.028	6B	2B	Au	B	2 1/2	1 1/8	10	40	(b)	1 ± 1/4	(f)	1 1/2	38
Ste	R	80	Ch-J-6	2–1/8	2–5/32	7/8	F	1 23/64	45	1 1/8	45	.372	AA	AA	.010	5A	1 1/2A	.018	.025	2B	1/2B	Ad	A	2 1/4	1 1/4	10	25	1 1/4	1	1/8	8	39
Ste	R	85	Ch-J-6	2–1/8	2–5/32	7/8	F	1 23/64	45	1 1/16	45	.372	AA	AA	.004	19B	6B	.018	.025	5B	1 1/2B	Ad	A	2 1/8	1 1/4	13	38	1 1/4	1	1/8	8	40
Ste	R	85	Ch-J-6	2–1/8	2–5/32	7/8	F	1 13/64	45	1 1/16	45	.372	AA	AA	.004	19B	6B	.018	.025	5B	1 1/2B	Ad	A	2 1/8	1 1/8	13	38	1 1/4	1	1/8	8	41
LH	O	145x	Ch-J-8	2–1/8	2–5/32	55/64	F	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	4A	1 1/2A	Au	A	1 13/16	1	5	14	3–5	1/4–3/4	0–1/8	4 1/2–5 1/2	42
LH	O	145x	A-A-7	2–1/8	2–5/32	55/64	F	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	4A	1 1/2A	Au	A	1 13/16	1	5	14	1–3	1/4–3/4	0–1/8	4 1/2–5 1/2	43
HM	S	141x	AC-45	2–1/16	1–3/16	15/16	P	1 15/32	30	1 13/32	45	.310	.012H	.012H	.015	5B	2B	.020	.025	2B	.....	Au	A	2	1 1/16	6	16	N 1/2–N 1 1/4	3/4–1 1/4	0–1/16	4° 51′	44
HM	S	141x	AC-45	2–1/8	1–3/16	15/16	P	1 15/32	30	1 13/32	45	.310	.012H	.012H	.015	5B	2B	.015	.025	2B	.....	Au	A	2	1 1/16	7	19	N 1/2–N 1 1/4	3/4–1 1/4	0–1/16	4° 51′	45
LH	R	105	Ch-8	2–1/8	1–3/16	7/8	R	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B	5 1/2B	.020	.025	2B	3/4B	Au	A	2 3/16	1 3/8	5 1/2	14 1/2	45′	1/2	1/16–1/8	5 1/2	46
LH	R	105	Ch-8	2–1/8	1–1/16	7/8	R	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B	5 1/2B	.020	.025	TC	TC	Au	A	1 7/8	1 1/16	8	17	45′	1/2	1/16–1/8	5 1/2	47
BM	G	87	Ch-C-7	3–3/32	1–3/16	15/16	F	1 17/32	45	1 15/32	45	.371	.004H	.006H	.010	TC	TC	.020	.025	5A	1A	Au	A	1 13/16	1 1/16	4	11	3	2	3/32	7 1/2	48

MAKES OF UNITS

†—Owen-Dyneto for Generator and Starter
A—Autolite
AC—AC Spark Plug Co.
BC—Carter and Chandler-Groves
BA—Burgess or AC
B&B—Borg and Beck
BH—Buffalo or Hayes (mufflers)
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic
BS—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess **Car**—Carter
CG—Chandler-Groves
Ch—Champion
D—Delco-Remy
Del—Delco
Dia—Continental Diamond Fiber
Det—Detroit **Exi**—Exide
F-O—Float-O **G**—Gemmer
Ge—General Electric Co.
GED—General Electric or Continental Diamond Fibre
HM—Bendix hydraulic and mechanical combined
LB—Link Belt
LH—Lockheed hydraulic
Mar—Marvel **Mec**—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own
OH—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Os—Own, semi-centrifugal
Pur—Purolator **R**—Ross
R-B—Rockford with Borg & Beck disk **Ro**—Rockford
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spi—Spicer **Ste**—Stewart-Warner
Str—Stromberg
Th—Thompson Products
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard
(z)—Or Champion **Y**—4

Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BANTAM		
Pick-up	465	
Panel	479	
Bus. Coupe	439	
Std. Coupe	469	
Roadster	479	
BUICK		
Special 40		
Sport Sedan, 2d.	981	3515
Tour. Sedan, 2d.	1006	3520
Sport Sedan, 4d.	1022	3535
Tour. Sedan, 4d.	1047	3560
Bus. Coupe, 2d.	945	3385
Sport Coupe, 2d.	1001	3425
Conv. Coupe, 2d.	1103	3575
Conv. Phae., 4d.	1406	3705
Century 60		
Tour. Sedan, 2d.	1256	3760
Sport Sedan, 4d	1272	3785
Tour. Sedan, 4d.	1297	3780
Sport Coupe, 2d.	1226	3690
Conv. Coupe, 2d.	1359	3815
Conv. Phae. 4d.	1713	3950
Roadmaster 80		
Phae., Conv., 4d	1983	4325
Tour. Sedan, 4d.	1645	4245
For. Sed., Tk., 4d	1758	4305
Sport Sedan, 4d.	1645	4245
Limited 90		
Tour. Sedan, 4d.	2350	4585
Lim. Trunk, 4d.	2453	4665
Tour. Sedan, 4d.	2176	4580
CADILLAC		
V8-Series 60		
Coupe, 2p.	1695	
Tour. Sedan, 5p.	1780	
Conv. Coupe, 2p.	1815	
Conv. Sedan, 5p.	2215	
V8-Series 60-S		
*Tour. Sedan, 5p	2090	
V8-Series 65		
*Conv. Sedan, 5p	2605	4580
Tour. Sedan, 5p	2290	4540
T. Sed., 5p. (Div.)	2360	4580
V8-Series 75		
Conv. Coupe, 2p.	3380	4665
Conv. Sed., Trk.	3945	5110
Coupe, 2p.	3280	4675
Coupe, 3-5p.	3380	4775
Town Sedan, 5p	3635	4900
Tour. Sedan, 5p.	3080	4865
Tour. Sedan Div.	3155	4925
Formal Sed., 5p	3995	4865
Formal Sed., 7p	3995	5105
Tour. Sedan, 7p	3210	4945
Bus. Tr. Sed., 8p.	3105	4945
Tour. Sedan, 7p.	3360	5105
Bus. Tr. Imp., 8p.	3260	5105
Town Car, 7p.	5115	5175
16-Series 90		
Conv. Coupe	5440	
Conv. Sed., Trk.	6000	
Coupe, 2p.	5340	
Coupe, 5p.	5440	
Town Sedan	5695	
Touring Sedan	5140	
Tour. Sed., (Div.)	5215	
Formal Sed., 5p.	6055	
Formal Sed., 7p.	6055	
Tour. Sedan, 7p.	5270	
Imp. Tr. Sed., 70	5420	
Town Car, 7p.	7175	
CHEVROLET		
Master Series HB		
Sedan, 4d	730	2840
Coach, 2d.	668	2795
Twn. Sed., Trk, 2d	689	2825
CHEVROLET (Cont.)		
Spt. Sed., Trk., 4d	750	2845
Bus. Coupe, 2d.	648	
Cabriolet, 2d.	755	
Master De Luxe Series HA		
Sedan, 4d.	796	2915
Coach, 2d.	730	2900
Tn. Sed., Trk., 2d.	750	2915
Spt. Sed., Trk., 4d.	817	2940
Bus. Coupe, 2d.	714	
Sport Coupe, 2d.	750	2870
CHRYSLER		
Royal Six		
Bus. Coupe, 2d.	918	3090
Coupe, 2d.	963	3135
Conv. Coupe		
Tour. Bro., 2d.	975	3165
Brougham, 2d.	963	3160
Tour. Sedan, 4d.	1010	3180
Sedan, 4d.	998	3170
Conv. Sedan		
Sedan, 7p., 4d.		
Sed. Lim., 7p., 4d		
Imperial Eight		
Bus. Coupe, 2d.	1123	3450
Coupe, 2d.	1160	
Tour. Bro., 2d.	1165	3560
Tour. Sedan, 4d.	1198	3565
Conv. Coupe		
Conv. Sedan, 4d.		
Custom Imp. 8		
Sedan, 5p.	2295	
Sedan, 4d., 7p.	2295	
Sed. Lim., 4d., 7p	2395	
DE SOTO		
Bus. Coupe, 2d.	870	3039
Coupe, rumb., 2d		
Brougham, 2d		
Tour. Bro., 2d.	930	3119
Sedan, 4d.	958	3134
Tour. Sedan, 4d.	970	3139
Conv. Coupe	1045	
Conv. Sedan, 4d.	1375	
Sedan, 7p., 4d.	1195	
Limousine, 7p	1285	
DODGE		
Bus. Coupe, 2d.	808	2877
Coupe, 2d.	858	2952
Conv. Coupe, 2d	960	
Sedan, 2d.	858	2977
Tour. Sedan 2d.	870	2957
Sedan, 4d.	898	2977
Tour. Sedan, 4d.	910	2967
Sedan, 4d., 7p.	1095	
Conv. Sedan, 4d.	1275	
Limousine, 4d.	1185	
FORD		
V8-60		
Tudor Sedan	640	2553
Fordor Sedan	685	2579
Coupe, 5W	595	2452
Standard V8-85		
Tudor Sedan	665	2777
Fordor Sedan	710	2800
Coupe, 5W	625	2678
De Luxe V8-85		
Tudor Sedan	725	2845
Fordor Sedan	770	2876
Phaeton	820	2851
Coupe, 5W	685	2709
Conv. Coupe	770	
Conv. Sedan	900	2986
Conv. Club Coupe	800	
Club Coupe	745	2791
GRAHAM		
Standard		
Coupe	995	
Comb. Coupe	1045	
Sedan, 4d.	1065	
Special		
Bus. Coupe	1095	
Comb. Coupe	1135	
Sedan, 4d.	1155	
Supercharger		
Bus. Coupe	1230	
Comb. Coupe	1270	
Sedan, 4d.	1290	
Custom Super Charger		
Bus. Coupe	1320	
Comb. Coupe	1360	
Sedan, 4d	1380	
HUDSON		
6-83		
Coupe, 3p., 2d.	909	2825
Brougham, 2d.	948	2935
Tour. Bro., 2d.	968	2940
Vict. Coupe 2d.	955	2880
Sedan, 4d.	984	3005
Tour. Sedan, 4d.	1005	3010
Conv. Coupe	1041	
Conv. Bro.	1104	
8-84 De Luxe		
Coupe, 3p, 2d.	990	3010
Brougham, 2d.	1028	3115
Vict. Coupe, 2d.	1031	3060
Tour. Bro., 2d.	1049	3120
Sedan, 4d.	1060	3135
Tour. Sedan, 4d.	1080	3160
Conv. Coupe	1121	
Conv. Bro.	1185	
8-85 Custom		
Coupe, 3p, 2d.	1080	
Brougham, 2d.	1134	
Vict. Coupe, 2d.	1131	
Tour. Bro., 2d.	1155	
Sedan, 4d.	1171	3190
Tour. Sedan, 2d	1191	3195
Conv. Coupe		
Conv. Bro.		
Country Club 8-87		
Sedan, 4d.	1199	3270
Tour. Sedan, 4d.	1219	3275
Terraplane		
6-81 De Luxe		
Coupe, 3p, 2d.	789	2725
Brougham, 2d.	822	2820
Tour. Bro., 2d.	843	2825
Vict. Coupe, 2d.	835	2780
Sedan, 4d.	864	2885
Tour. Sedan, 4d.	884	2890
Conv. Coupe, 2d.	926	
Conv. Bro., 2d.	990	
6-82 Super.		
Coupe, 3p, 2d.	845	
Brougham, 2d.	878	2865
Tour. Bro., 2d.	899	2870
Victoria, 2d.	886	2805
Sedan, 4d.	915	2925
Tour, Sedan, 4d.	935	2930
Conv. Coupe, 2d.	971	
Conv. Bro., 2d.	1034	
HUPMOBILE		
Six		
Tour. Sedan, 4d.	1045	3320
Sedan, 4d.	1180	3370
DeL. Sed., 4d.	1222	3400
Custom Sed., 4d.	1340	3440
Eight		
Tour. Sed., 4d.	1325	3955
DeL. Tr. Sed., 4d	1365	4085
Cus. Tr. Sed., 4d.	1485	4125
LA SALLE		
Series 38-50		
Conv. Coupe	1420	3735
Conv. Sedan	1825	3870
Coupe	1295	3745
Tour. Coupe	1345	3800
Tour. Sedan, 4d.	1385	3830
LINCOLN		
V12—136 in. wb.		
Conv. Roadster	5300	
Coupe	5300	5435
Wilby Coupe	5900	5615
Sedan, 4d	4900	5735
Brunn Vict.	5900	5530
V12—145 in. wb.		
Wilby. Tour.	5900	
Jud. Berline	6000	5770
Jud. Berline	6100	5840
Jud. Sed. Lim.	6300	5950
Brunn Cabriolet	6900	6010
Brunn Cabriolet	7000	6030
Brunn Tour. Cab	7200	5870
Brunn Brougham	7000	6120
Sedan	5100	5880
Limousine	5200	5970
Conv. Sed. LeB.	5800	5670
Conv. Sed. LeB.	6000	5780
Wilby. Lim.	6200	6140
Wilby Sport Sed.	7000	6030
Wilby. Panel Bro.	7400	
LINCOLN-ZEPHYR		
Coupe, 3p, 2d	1295	3410
Sedan, 4d	1375	3560
Sedan, 2d	1355	3525
Limousine, 4d.	1550	3590
Conv. Coupe	1650	3605
Conv. Sedan	1790	3840
NASH		
Nash-La Fayette Master		
Bus. Coupe	770	
Sedan, 2d.	805	
Sedan, 4d.	850	
De Luxe		
Cabriolet	940	
A. P. Coupe	860	
Sedan, 2d.	855	
Bus. Coupe	820	
Sedan, 4d.	900	
Nash-Ambassador Six		
Bus. Coupe	970	
A. P. Coupe	1015	
Sedan, 2d.	1000	
Sedan, 4d.	1050	
Cabriolet, 2d.	1090	
Nash-Ambassador Eight		
Bus. Coupe	1120	
A. P. Coupe	1165	
Sedan, 2d.	1150	
Sedan, 4d.	1200	
Cabriolet, 2d.	1240	
OLDSMOBILE		
Six		
Bus. Coupe, 2d.	870	3205
Club Coupe, 2d.	926	3195
Sedan, 2d.	916	3275
Tr. Sed., Trk., 2d	941	3265
Sedan, 4d.	967	3285
Tr. Sed., Trk., 4d	992	3290
Conv. Coupe, 2d.	1043	3360
Eight		
Bus. Coupe, 2d.	986	3400
Club Coupe, 2d.	1032	3385
Sedan, 2d.	1027	3475
Tour. Sedan, 2d.	1053	3465
Sedan, 4d.	1078	3490
Tour. Sedan, 4d.	1104	3480
Conv. Coupe, 2d.	1160	3530
PACKARD		
Six-1600		
Tour. Sedan, 4d.	1175	3525
Tour. Sedan, 2d.	1145	3475
Club Coupe	1120	3425
Conv. Cpe., 2-4p.	1235	3500
Business Coupe	1075	3450
Chassis	810	2485
Eight-1601		
Tour. Sedan, 4d.	1325	3650
Tour. Sedan, 2d.	1295	3600
Club Coupe	1270	3550
Conv. Cpe., 2-4p.	1365	3625
Conv. Sedan	1650	3775
Bus. Coupe	1225	3570
Chassis	960	2620
Eight-De Luxe-1601-D		
Tour. Sedan	1540	3685
Eight-1602		
Tour. Sedan, 7p.	1955	4195
Tour. Lim.	2110	4245
Super-Eight-1603		
Tour. Sedan, 4d.	2790	4530
Chassis	2090	3300
Super-Eight-1604		
Formal Sedan	3710	4795
Tour. Sedan, 4d.	2995	4670
Club Sedan	2990	4600
Coupe, 5p.	2965	4595
Coupe, 2-4p.	2925	4585
Conv. Cpe., 2-4p.	3210	4580
Victoria	3670	4650
Chassis	2170	3375
Super-Eight-1605		
Tour. Sedan, 7p.	3165	4700
Tour. Lim.	3305	4815
Conv. Sedan	3970	4945
Chassis	2230	3430
Twelve-1607		
Formal Sedan	4865	5550
Tour. Sed., 4d.	4155	5525
Club Sedan	4255	5520
Coupe, 5p	4185	5415
†Coupe, 2-4p.	4135	5255
†Conv. Cpe., 2-4p	4370	5255
†Victoria	5230	5345
Chassis	2950	3910
Twelve-1608		
Tour. Sedan, 7p.	4485	5600
Tour. Lim.	4690	5660
†Conv. Sedan	5390	5680
Chassis	3140	3965
PIERCE-ARROW		
Eight Model 1801		
Sedan	3375	5675
Club Sedan	3480	5600
Coupe	3375	5645
Conv. Roadster	3480	5590
Club Berline	3630	
Formal Sedan	3630	
Sedan, 7 p.	3690	5820
Enc. Dr. Lim.	3840	5860
Brunn Town Bro.	5520	5840
Conv. Sedan	4300	
Sedan, 7p.		
Twelve Model 1802		
Sedan	3895	
Club Sedan	4000	5850
Coupe	3895	5855
Conv. Roadster	4000	5800
Club Berline	4155	
Formal Sedan	4155	
Sedan, 7 p.	4210	6065
Enc. Dr. Lim.	4360	6105
PIERCE-ARROW (Cont.)		
Brunn Town Bro.	6040	6085
Conv. Sedan	4820	5921
Twelve 1803		
Sedan	5015	6125
Enc. Dr. Lim.	5220	6145
PLYMOUTH		
Six P5		
Coupe, 2d.	645	2694
Sedan, 2d.	685	2744
Sedan, 4d.	730	2774
De Luxe Six-P6		
Coupe, 2p.	730	2754
Coupe, 2-4p.	770	2799
Conv. Coupe, 2d.	850	
Sedan, 2d.	773	2814
Sedan, 4d.	803	2834
Tour. Sedan, 2d	785	2819
Tour. Sedan, 4d	815	2844
Sedan, 7p.	1005	
Sedan Lim.	1095	
PONTIAC		
De Luxe Six		
Eus. Coupe, 2d.	835	3180
Sedan, 2d.	865	3265
Sport Coupe, 2d	891	3200
Tour. Sedan, 2d.	891	3265
Cabriolet, 2d.	993	
Sedan, 4d.	916	3285
Tour. Sedan, 4d.	942	3285
Conv. Sedan	1310	
De Luxe Eight		
Bus. Coupe, 2d.	898	3320
Sedan, 2d.	934	3395
Sport Coupe, 2d	955	3325
Tour. Sedan, 2d.	960	3405
Cabriolet, 2d.	1057	
Sedan, 4d.	980	
Tour. Sedan, 4d.	1006	3420
Conv. Sedan	1353	
STUDEBAKER		
Six		
Bus. Coupe, 3p.	875	
Cus. Coupe, 3 p.	900	3060
Club Sedan	955	3140
Cruis. Sedan	965	3190
Conv. Sedan	1315	
Commander		
Cus. Coupe	965	3095
Club Sedan	1030	3160
Cruis. Sedan	1040	3215
Conv. Sedan	1390	
President		
Cus. Coupe	1120	3335
Club Sedan	1185	3400
Cruis. Sedan	1195	3455
Conv. Sedan	1555	
WILLYS		
Model 38		
Economy Coupe	499	2181
Standard Coupe	525	2181
De Luxe Coupe	579	2181
Standard Sedan	573	2300
De Luxe Sedan	624	2306
Custom Sedan	715	2315

*—5 Wheel Equipment

†—6 Wheel Equipment

COMING ATTRACTION!

THE SOUND-SLIDE FILM HIT—

"Mr. Dealer Goes to Town!"

WITH

Packard

REG. U. S. PAT. OFF. TRADE MARK

CABLE

MAC

. . . is the proprietor of the garage. He's a boy with plenty of ideas, who turns his cable replacement business into a big profit item. Mac has some tips that will boost your business. He knows automobiles—and selling.

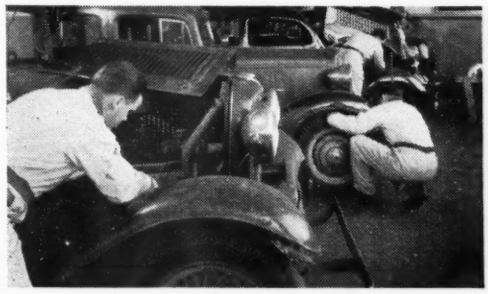
JOE

. . . is Mac's partner. He's from Missouri, and it takes real honest-to-gosh facts to convince him. At first he has his doubts about Mac's plan, but he finally admits—"Boy, Mac, when you do get an idea it's a honey!" You'll think so too.

JAKE

. . . is the mechanic. He discovers that Mac's idea makes him a *salesman* as well as a mechanic. He and Joe have a little feud on, but everything turns out fine. As Mac says, "We've all got to work together on this thing!"

HERE'S WHERE THEY WORKED



This film gives you cold facts. The scene is a real garage—no fake stage effects. You'll enjoy it, and you'll get something out of it. Don't miss it!

ASK YOUR PACKARD JOBBER SALESMAN

Make arrangements for a showing next time you see him, or give him a call. Mr. Dealer, get set to go to town!

Packard

REG. U. S. PAT. OFF. TRADE MARK

It's good business to buy from your Packard jobber.

THE STANDARD WIRING EQUIPMENT OF THE AUTOMOTIVE INDUSTRY

School Days

(*Continued from page* 26)

Auto-Lite Company. At the conclusion of the course each student's work is analyzed and a letter is written to his employer giving the student's school rating and suggestions for continuing his studies.

The course is more than a study of Auto-Lite ignition systems. In reality it is a complete automotive electric course—covering as it does, all units pertaining to the electrical equipment, and devoting close attention to the functioning of other important units and their relationship to motor car performance as a whole. In short, students are given a thorough course of study covering the functioning of various units in a car, to enable them to make tests, adjustments, and repairs in such a manner that the car's performance will be satisfactory to the owner.

At the beginning of the course, each student is given a handsome leather-bound binder with his name stamped on the front. At the conclusion of each lecture, students are given a printed copy of the text of the lecture, with illustrations, charts, and diagrams and once a man has taken the course, all additional material of this nature goes to him automatically. Space is provided in the binders for notes by the students, and since the school releases additional information to them as it is available, the books become invaluable for future reference.

As previously stated, the course lasts fifteen days—that is, from Monday to Friday, inclusive, for three consecutive weeks. Days are divided into four study-periods of an hour and a half each. Thus, deducting the time required for trips through Auto-Lite plants in Toledo and Port Huron, there is a total of 84 hours of study, divided as follows: class room and lecture work, 39 hours; shop work, 45 hours.

In the case of most students, it has been many years since they have done any studying. Therefore, careful pains are taken to show them how to study and to get the greatest benefit from the course.

Inasmuch as shop work constitutes one of the most important phases of the entire course, Auto-Lite has set up what is actually a model automotive service station—with shop facilities for handling five cars at once. Provision is made for making thorough motor analyses, and test equipment is provided for checking the performance of generators, starting motors, distributors, and other units.

The testing equipment was chosen with a view to utility rather than showmanship. In this connection it is interesting to note that there is no sales promotion in the school, everything being confined exclusively to service.

Into the model service station which Auto-Lite has provided for the necessary shop work connected with the course, cars are brought that need repairs or are out of adjustment in some way or other. Students are required to locate and remedy the trouble—using instruments and testing equipment provided for this purpose. Each man is required to make his own tests, and to hook up the necessary apparatus according to instructions in doing so. Thus students put into actual practice the theories and knowledge gained from lecture periods and classroom work.

Therefore, when a student completes the course, he not only knows *what* to do—in unusual cases as well as the commonplace—but he knows *why* it is done. Plenty of automotive service men know that the generator output, according to the manual, on one car, for example, should be set at 22 amperes, and another at 30 amperes. But how many such men know why a particular charging rate is correct for one car, but incorrect for another?

This course enables service station men to know the "whys and wherefores" of various automotive electrical tests and adjustments. Thus they follow recommended service procedures for a sound, fundamental reason—instead of making certain adjustments simply because a printed manual tells them to do so. Furthermore, students passing the course have a thorough understanding of the basic laws which govern the functioning of all starting, lighting and ignition systems, regardless of make. When they return home, they are in better position than ever to render efficient automotive electrical service.

THE STRONGEST LINK IN 1938 BETWEEN SAFETY AND LIGHTING

K-D AUTO LAMPS

It's "Quality First" throughout the entire K-D Line . . . quality in design, engineering and production. For 1938 the K-D Line is FIRST in advanced ideas . . . in technical perfection . . . in harmonious beauty of design.

MODEL No. 855
K-D FOG LAMP

A masterful lamp which masters fog, sleet, dust, snow or rain. All chromium. 7" lens. Prefocused Mazda bulb. New bracket. Installed in pairs for added safety.

Write for new K-D Catalog just off the press.

THE K-D LAMP CO.
CINCINNATI, OHIO

THERMOID "SAFETY SERVICE" boosts sales and profits

T. L. Falvey, of Merchantville, N. J., reports on his experience as a Thermoid Preferred Dealer.

"Since I adopted the Thermoid Preferred Dealer Plan and made 'Safety Service' a specialized and completely related department, my sales volume on all safety items has averaged an increase of over 40%.

"Naturally, 'safe driving' is most dependent upon safe brakes and for that reason we have used brake service as the foundation of our 'Safety Service Department'. We have found that Thermoid Brake Linings are easier to sell, easier to install, and that they never 'come back'.

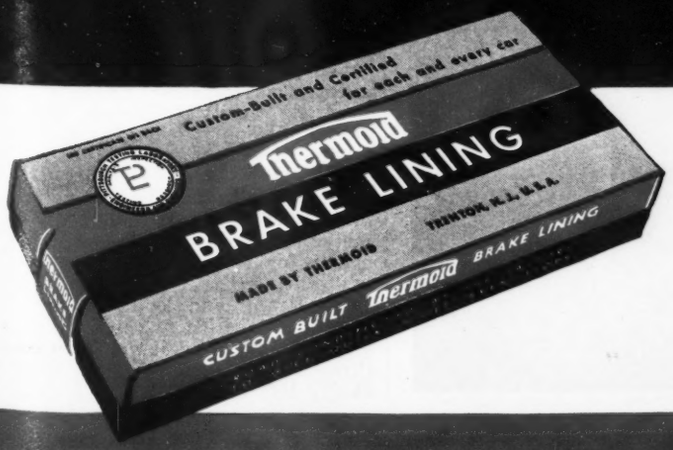
"With our 'Safety Service' setup, every brake lining customer offers a real opportunity for the sale of related safety items. Our business on steering adjustment, wheel alignment, tires and headlight work has been increased substantially."

We'll rest our case on that statement. Mr. Falvey has told the Thermoid story far better than we could. Like thousands of other dealers, Mr. Falvey found that the Thermoid Preferred Dealer Plan does four things:

- Brings the car owner in for service
- Helps sell a profitable job
- Helps do the job
- Brings the customer back for related "Safety Service"

And don't forget . . . Thermoid Preferred Dealers make an extra profit on every sale.

Write today for details of the Thermoid Preferred Dealer Franchise. It'll be a business-building, money-making move on your part.


Custom-Built and Certified for each and every car
Thermoid
BRAKE LINING
MADE BY THERMOID
TRENTON, N. J., U. S. A.
CUSTOM BUILT Thermoid BRAKE LINING

Thermoid

Custom-Built

BRAKE LINING SETS

THERMOID CO., TRENTON, N. J. ★ IN CANADA, THERMOID LTD., TORONTO

The Green Flag

(*Continued from page* 38)

Pit stops, it's superfluous to state, cost valuable minutes in the heat of campaign, and the new rules undoubtedly will result in faster speeds for the 500 miles, even out-pacing the record established last Decoration Day by the now-Champion Wilbur Shaw at 113.580 miles per hour.

Forecasting these new speed records is the entry blank's own provision for a faster gait in qualifying trials. The 1937 stipulation of a minimum 105 miles per hour to get into the race has been hiked to 110 miles per hour for ten laps, twenty-five miles, of the track.

For the first time since 1929, one-man cars will be allowed at Indianapolis, thanks to the International rules. The specifications provide that cars "may have one or two seats" and must present a minimum exterior width of 33.46 inches. The 1937 rules provided a minimum width of thirty-one inches "at the base of the drivers' seat."

Outstanding in the new International Formula are provisions for small engines. The 366 cubic inches —which has been the maximum since elimination of the 91.5 super-charged single-seaters at the close of the 1929 campaign—is now down to 274.59 cubic inches. This figure is for non-supercharged cars, and those drivers wishing to use a "blower" must hold their displacement to a 183.06 maximum. Throughout, a scale has been drawn to restrict the weight according to the displacement.

In the twenty-five international sweepstakes run at Indianapolis since 1911, big engines have predominated. But every victory has been won by a car powered below the allowed maximum.

It has been, for a long time, an argument among speed engineers that design is more important to speed than is size.

The trend toward smaller cars has been particularly evident since Bill Cummings swept to a record victory at Indianapolis in 1934 with a four-cylinder Miller. For thirteen years previous to that time, eight-cylindered mounts annually led the field across the line. True it is that the gasoline limit had much to do with use of the smaller engines, but Wilbur Shaw continued to use a four-cylinder mount last year, with the limit on the fuel supply lifted.

Any conclusion as to what is going to happen with racing under the new International Formula next year, at this point, could be only a laboratory conclusion. But the fraternity says it's going to bring about a "hands across the sea" expansion of competition—and who should better know?

Two words win Customer Confidence

"Original Parts"

When you sell Weatherhead parts you immediately eliminate any doubt in your customer's mind. There is no question, "Are they as good as the original?" Weatherhead parts *are Original parts.* The fact that every motor car made today carries a Weatherhead part some place or other is proof of Weatherhead quality.

THE WEATHERHEAD CO. · CLEVELAND, OHIO

WEATHERHEAD

FITTINGS · FUEL LINES · BRAKE HOSE · DASH CONTROLS · HYDROMETERS

Eyston's Log

(*Continued from page* 28)

November 3—Again refusing to sit idle while his nine mechanics worked over "Thunderbolt," Captain Eyston hopped into "Speed of the Wind" for the second attempt at the 24-hour record held by Ab Jenkins at 157.27 miles per hour—but 12 hours was the extent of Fate's patience and after a dawn to dusk run he counted a new record in three divisions, 3000 kilometers, 2000 miles and 12 hours.

November 6 — Mechanical failure, for the third time, cut short a run for the record. It was the second time Eyston had turned in a one-way average better than Campbell's two-way record of 301.1292 miles per hour.

But his estimated 310 miles per hour in one direction was not "proved" by a run in the opposite route, for the clutch gave out again.

A double dose of tough luck cast a shadow on the one-way run, for the electric eye timing device stuck at the end of the measured mile and the official timers estimated the gait at 310 miles per hour. Eyston said his tachometer equalled some 311 miles per hour.

November 19—Success! His perseverance rewarded, Captain Eyston breezed "easily" through the measured mile on two quick trips, in opposite directions, to establish a new world land speed record of 311.42 miles per hour for the measured mile, and 312.20 miles per hour for the kilometer. And to three Americans went credit for the British victory! Congratulating the veteran Riley Brett, Dave Frank and Eddie Miller, Captain Eyston said: "I could never have made the run had it not been for the three fine Americans who fixed my faulty left clutch."

A Letter from Hal Roe

(Continued from page 27)

couldn't get over. I sometimes wondered if the body was so heavy it simply couldn't haul it along any faster or if it simply had a guilty conscience regarding speed laws. I tried rich and lean mixtures, hot and cold plugs, thinking it might be plug "paralysis" but it didn't help.

What is your reflection on such, as described? Could it be a compression fight-back as suggested? If I could only have got it over that hump, it would have been O.K. It did the same thing supercharged, only worse.

I forgot to mention about the valve timing on my car in conjunction with the 7.1 head and the high lift camshaft. Some of the boys insist I have it timed wrong but, quoting Studebaker Service Bulletin 64A, page 14, they say—"Ordinarily the only attention required in this connection is that of properly locating the markings on the camshaft and crankshaft gears when checking or installing the gears. However, if for any reason a more extensive check is considered desirable, the valve timing should be such that the intake opens 15 deg., 1 25/32 in., ahead of upper dead center. All timing should be made with 0.010 tappet clearance."

I set my timing by this, so if the factory is correct, my motor must be also.

I certainly appreciate your kindness of replying to these queries and I am sure the other boys feel the same.—*H. A. Roe, Paramount Auto Service, 218 E. First Street, Duluth, Minn.*

HOW CAN I FIX THEM?

IT'S A CINCH NOW!

These two pictures, reproduced from life size oil paintings, were one of the recent outstanding features of the recent Chicago Show. As a part of Hygrade's display they put across a message of vital importance to every repair shop.

It's a "cinch" for EVERY SHOP with HYGRADE'S "Contain-All" Kits For CARBURETORS & FUEL PUMPS

SOLVED!—That vexing problem—How to repair Carburetors and Fuel Pumps! Like the mechanic in the picture you, too, will find the answer in Hygrade's inexpensive little "Contain-All" Kits. All the parts for complete reconditioning. Guesswork and worry put on the skids. No time lost tinkering. No Marathons to your jobber for additional parts.

And—every dollar of profit from every job is YOURS because the work is done in YOUR shop instead of being farmed out! When you send a job "outside" you are buying labor at a sacrifice of your profits!

Write for particulars—Today

Hygrade Line AUTOMOTIVE PRODUCTS

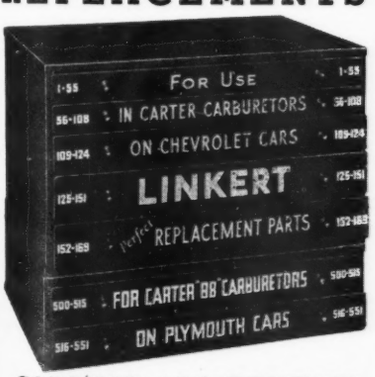
"Don't BUY Labor—SELL IT!"

Hygrade Products enable the Repairman to take care of specialized jobs in his own shop, keeping his profits at home.

SERVICE PARTS FOR
CARBURETORS FUEL PUMPS
SPEEDOMETERS SHOCK ABSORBERS
TEMPERATURE GAUGES, ETC., ETC.

HYGRADE PRODUCTS CO., 516 WEST 34th STREET, NEW YORK CITY

YOU NEED THIS LINE
LINKERT
PERFECT ENGINEERED PARTS FOR
CARBURETOR REPLACEMENTS



CORRECT ASSORTMENTS FOR
CHEVROLET AND PLYMOUTH
LANGSENKAMP-LINKERT CARBURETOR CO.
INDIANAPOLIS - INDIANA

Okonite Sound Film

The Okonite Company, Passaic, N. J., has just completed a new two-reel sound film showing how rubber insulated wires and cables are made and used. Lowell Thomas is the narrator. It will be shown without charge to those interested in this subject.

Short Cuts on Overdrives

(Continued from page 11)

ion shaft and press the pinion out of the bearing rearward, through the case. Then tap the bearing out of the case toward the front and lift the cluster out of the rear end of the case. Then remove the reverse idler shaft and key and then the reverse idler gear.

This completes the disassembly of the unit. To reassemble follow the reverse of the foregoing procedure. However there are a number of precautions that must be observed.

On the countershaft, the bronze thrust washers are placed next to the case and the steel washers go next to the cluster. To align the countershaft gear assembly for installation of the shaft, rest the transmission on the flat or cover face. The dummy shaft is left in the countershaft to hold the needle bearings in place and is pushed out as the countershaft is installed.

The synchronizer unit should always be installed with the chamfered edge toward the front of the car.

Install the overdrive rear shaft over the free-wheeling rollers before installing the housing assembly. The rollers can be held in place with a rubber band until the shaft has partly engaged them. Then the rubber band can be removed.

If the overdrive outer shell has been removed from the pinion gears, reassembly should be made as follows: Push the overdrive pinion gears on the sun gear just to the depth of the narrow gears. Holding them in this position, have another mechanic turn the outer shell against the tension of the spring in the narrow gears. Continue the rotation until the marks on the wide gears line up with the marks on the narrow gears. Then push the gear and case assembly forward to engage both gears.

Trindl ELECTRIC ARC WELDER

Works Off Any Storage Battery or Ordinary Light Socket...

$3.75

This New Electric Arc Welder is made possible by the invention of a low voltage carbon. Auto batteries may be used without removing from car. Uses about same current as four headlight bulbs. Can be used on 110 Volt electric light socket or 32 Volt electric light plant by using a Trindl Converter in place of battery. Broken parts are SIMPLY MELTED TOGETHER by the white HOT electric arc in just a few seconds. Produces about 7,000 degrees heat.

HOTTEST FLAME KNOWN

Melts iron and steel instantly. Welds fenders, radiators, holes in bodies and milk cans, tanks and brazes broken castings.

WORKS on ANYTHING

iron, steel, copper, brass, tin or galvanized metal. Permanent repairs made for almost nothing. Used by factories in many operations. Positive money back guarantee.

AGENTS
Men with cars to sell mechanics, repairmen and farmers, factories, radio and battery shops. Five minute demonstration makes sales. Up to 150% profit! Write TODAY.

TRINDL PRODUCTS
2229-AM Calumet Ave., Chicago, Ill.

NOW...

the New 1938 Model

ACE-HY

HYDRAULIC

BUMPER JACK

Will Sell

FASTER THAN EVER!

Its new, bright ZIN-O-LITE specification plating finish, its neat trim of bronze lacquer, insure against rust . . . and add "eye-appeal". Its improved internal construction makes it more efficient—easier to operate.

DEALERS EVERYWHERE

report that ACE-HY is the fastest selling jack on the market . . . because it's so practical—so much more convenient . . . so easy to use.

It's the modern jack for the modern car . . . no kneeling . . . no crawling under car . . . no projecting levers . . . nothing to lose or put together.

SHOW HOW EASY IT WORKS
SEE HOW EASY IT SELLS

List Price $7.50

PACIFIC COAST & CANADA SLIGHTLY HIGHER

Ask your Jobber, or Write

VULCAN Manufacturing Co.

SAINT PAUL, MINN.

Low-down on Overhead

(Continued from page 13)

ured up one day and found that I can make more money by discounting my bills—and make it a lot easier—than I can by working in the shop. If you save 2 per cent by paying in 10 days and do it three times a month—well, that's 6 per cent saved. Multiply that by twelve months in the year and you've got something that beats hard work as a source of revenue. With me a dollar saved is a dollar earned, and I can't understand why so many shops penalize themselves by letting bills run for 30 or 60 days. It doesn't seem to make sense. A fellow's cash balance in his business ought to be put to work the same as his merchandise."

Philips has an idea that is rather novel among automotive shop operators. He not only thoroughly understands what overhead is, and what it can do to any business, but he knows to the penny what his own overhead is. And furthermore he does something about it. The truth is that he is really scared of it, and goes a long way and uses a lot of energy to keep it in its place. Old Man Overhead isn't going to catch him napping and toss him for a loop.

"My overhead is exactly $6.56 a day," he explained. "That covers light, heat, rent, phone, wages, transportation, materials and supplies and all the other little incidentals averaged over a period of months. That doesn't look very high but it means that I have to net that much profit on parts or labor sales every day before I can start to collect a dime for myself. If I don't net a profit of over $6.56 a day it simply means that I'm just working free for the other fellows. And there isn't a bit of fun in that.

"Overhead doesn't worry me as long as the shop is going full steam, but on a slack day it would give me a headache if I didn't do something about it. What I do is simply this: When a dull day comes along it gives me more time to work on the customers that do happen in. If a man drives up for battery water I take time to check his cables, examine his tires, ask about his oil filter or try to get him to say 'yes' to a lubrication job. I mean I really work on the customer—in a nice way—because all the time I'm thinking about that old overhead that's crawling up on me.

"If it gets to be three or four o'clock," Philips continued, "and we haven't taken in enough to meet the overhead with a few dollars extra for me, I usually hop in the car and go out to drum up business. I work hard at it because I realize I'm getting nowhere fast unless I produce results. You'd be surprised how much stuff you can sell when you give it all you've got. One day last week we had done only about ten dollars worth of business all day—gross—and about quitting time I just felt I'd have to do something about it. On my way home I happened to think about a truck owner I'd been intending to see but just hadn't got around to it. I caught him at home and inside of half an hour I'd sold him eight truck tires and one battery. I don't stock up on

(Continued on page 55)

Whiz — *Genuine* **No. 3 BRAKE FLUID**

WON'T GUM OR STIFFEN EVEN AT 50° BELOW ZERO

USE IT ON YOUR NEXT JOB FOR 100% BRAKING SATISFACTION

R. M. HOLLINGSHEAD CORP.
CAMDEN, N. J., • TORONTO, CAN.

WEED AMERICAN
BAR-REINFORCED
TIRE CHAINS
•
more than double the safety mileage

AMERICAN CHAIN & CABLE COMPANY, INC.
Bridgeport, Connecticut

A NEW YEAR'S RESOLUTION—

Sinko

SPIN-UR-WHEEL BEZ-L-BALL

Help car owners make this simple New Year's resolution—to have Sinko Spin-Ur-Wheel and Bez-L-Ball on their cars. Spin-Ur-Wheel is instantly attachable to any steering wheel and comes in six popular colors with novelty crystal insert, fluted, oval and pear-shaped styles, with chrome or enamel base. Bez-L-Ball, gear lever ball, is available as running mate to the parking, backing, turning aid in matching colors and designs.

SINKO TOOL & MFG. COMPANY
351-371 N. Crawford Ave. CHICAGO, ILL.

ARROW

DIRECTIONAL SIGNALS
FOG & DRIVING LAMPS
ELECTRIC FLARES
SAFETY EQUIPMENT

The Standard of Safety on the Nation's Highways.

Write for Catalog

ARROW SAFETY DEVICE CO., Inc.
Medford, N. J.

MOTOR AGE

—is a publication keyed directly to the needs of the maintenance field. Built on the requirements of the serviceman. Edited by Bill Toboldt. Read it every month.

A Chilton Publication

CHESTNUT AND 56TH STS.
PHILADELPHIA, PA.

Get this FREE Catalog of
TIME and LABOR SAVING TOOLS

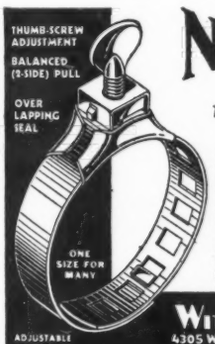
Ask your jobber —or write us.

THE HERBRAND CORPORATION
FREMONT, OHIO

For running-in new and rebuilt engines use auxiliary lubricants containing "dag"* Brand colloidal graphite.

Acheson Colloids Corporation
Port Huron dag Michigan

*REG. U. S. PAT. OFF.



TRADE MARK
NOC-OUT HOSE CLAMPS
THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable—one size equals many. Quick tightening, perfect seal. Makes radiators and heaters "Anti-Freeze" tight. Stock up now and be ready for the first cold snap. AT ALL JOBBERS.

WITTEK MFG. CO.
4305 W. 24th Pl., Chicago, U.S.A.

THE LINE THAT LEADS TO PROFITS

REMCO
SHOP EQUIPMENT

Hydraulic Presses, Wrecking Cranes, Car Washers, Jacks, Trestles, Creepers, Oil Spray Guns, etc.

Write for FREE literature.
THE REMCO PRODUCTS CORP.
State & Hay Sts., York, Penna.

PROFIT IN EMERGENCY CALLS

Instead of driving a car, go on a Moto-Scoot. Coming back, hook Moto-Scoot on behind the car. Saves time! Saves men!

120 Miles per Gallon

$89.00 UP f.o.b. Chicago

Sturdy low bar available.

Moto Scoot
219 S. WESTERN AVENUE, CHICAGO

Chevrolet Clutch

(Continued from page 17)

With the nuts and lock washers removed, the cover can be lifted off the bolts by tapping lightly with a soft hammer, after which the upper pivot ring and special flat washers may be taken from the assembly.

The compression screw of the clutch assembling fixture should next be backed off, as in Fig. 4, after which the diaphragm spring, lower pivot ring, special flat washers and cover bolts may be removed.

All parts of the clutch, except the driven disk and throwout bearing should be washed in clean gasoline before inspecting. The throwout bearing is permanently lubricated with a high melting point lubricant which must not be washed out.

Check the pressure plate for scores on its contact surface and see that it moves freely when placed in the cover, as in Fig. 5. The drive lugs should have a clearance of .004 in. to .008 in. in their slots and should be free of burrs. The diaphragm spring and pivot rings should be examined for distortion and the throwout bearing checked for roughness of balls or races. See that the throwout bearing assembly slides freely along the bearing retainer sleeve.

Examine the clutch disk for rough or worn facings, loose rivets or broken springs. See that the splines in the hub of the clutch disk slide freely on the clutch shaft, over the whole length of action. Check the ball in the throwout fork for losseness or end play. Any parts of the clutch which show excessive wear or are unsuitable for satisfactory operation should be replaced at the time of reassembly.

To reassemble the clutch, place the nine spring bolts in the hexagonal openings in the fixture and install the lower pivot ring over the bolts. The pivot ring has three pairs of lugs on its inner circumference which should straddle three of the cover bolts, as shown in detail in Fig. 6. Next, coat nine special flat washers lightly with graphite grease and place one on each bolt.

Place the diaphragm spring on the cover bolts with the inner ends of the fingers slanting upward, and compress the diaphragm spring with the compression screw of the fixture. Coat the remaining nine special flat washers lightly with graphite grease and place one on each bolt next to the diaphragm spring. Install the upper pivot ring making sure that each pair of lugs straddles a bolt as was done with the lower pivot ring. Place the clutch cover over the bolts and install lock washers and nuts. Tighten the nuts securely and remove the assembly from the fixture.

Place the pressure plate in the clutch cover, making sure that the zero (0) marks align and install the three retracting springs by sliding them through the slots in the clutch cover. Install the retracting spring bolts and tighten them securely.

The arrow in Fig. 8 shows the location of an "X" mark on the clutch cover. This mark should align with a similar mark on the flywheel when reinstalling clutch in engine, in order

(Continued on page 54)

Continuous PERFORMANCE

AN Atkins Saw stays on the job long periods between filings, turning out more work by keeping steadily at it. This is *continuous performance,* the finest quality you can buy in a saw. All the values put into Atkins Saws by our expert staff, equipment, and highly trained factory men come to you combined, in the speed of the "teeth that bite" —the power of each tooth as it strikes—and the stamina of Atkins Saw Steel—All summed up in two words, *continuous performance.*

Next time you choose a saw, remember what you really want most of all is reliable performance, *continuing* when other saws are out of the running—So, *ask for an Atkins.*

***To those who will buy Atkins Saws for re-sale, their continuous performance for over 80 years as merchandise is impressive. Take it as an emphatic reminder to stock the line in a full assortment of styles, sizes and prices.*—E. C. Atkins and Company, 423 South Illinois Street, Indianapolis, Indiana.**

ATKINS *Certified* SAWS
SAW TOOLS, MACHINE KNIVES, ETC.
"TEETH THAT BITE"

From Coast

. . . THEY ALL SAY

AUTO-LITE SPARK PLUGS

Ignition Engineered

CALIFORNIA . . ."I can truthfully tell you that we have found Auto-Lites to be the most satisfactory spark plugs we have ever sold."

ARKANSAS . . ."We are certainly glad we are Distributors of Auto-Lite Plugs, as our sales on plugs have doubled, since taking on the line, and we are really proud to offer Auto-Lite for sale."

NEW YORK . . ."We are now enjoying a greatly increased and more satisfactory spark plug business than ever before and with the rapid adoption of Auto-Lite Spark Plugs as Standard Equipment we have every confidence that Auto-Lite will soon assume position No. 1 in the spark plug field, which it so richly deserves."

TENNESSEE . . ."The very satisfactory experience we have had with Auto-Lite Plugs together with this standard equipment feature and the outstanding advertising the Electric Auto-Lite Company is putting out on their Spark Plugs makes us feel very optimistic with regard to future distribution."

NEBRASKA . . ."Occasionally we are fortunate in securing a product for distribution which seems to be a 'natural.' Such has been our experience with Auto-Lite Spark Plugs."

NEW JERSEY . . ."Your advertising is phenomenal, your sales helps the best, in fact your cooperation in putting this plug across exceeds anything we expected."

VIRGINIA . . ."Of major interest to wholesalers everywhere is the very fact that the quality of your product has only been equalled by the quality of your sales representation and merchandising program!"

MARYLAND . . ."We have never had any better reception on a line in our entire experience in the jobbing business. We have passed this observation on to our customers."

MASSACHUSETTS. . ."We have been selling Auto-Lite Spark Plugs since April 1, 1937 and during that period of time, we have more than doubled our sales of other makes of spark plugs for the entire previous year."

CONNECTICUT . . ."Since taking on the Auto-Lite Spark Plug last spring, we have been greatly surprised to know that our plug sales have tripled. We have been equally amazed at the performance of the plug."

NEW JERSEY . . ."We have at no time during our experience handled a line which received public acceptance so readily."

STANDARD EQUIPMENT ON 1938 MODELS . . .

to Coast...

WE WANT

IT'S THE GREATEST SALES RECORD IN HISTORY! A record made by Auto-Lite Spark Plug dealers during their first full year selling Auto-Lite Spark Plugs . . . A record unmatched in the annals of an industry accustomed to "doing things." From coast to coast, letters say . . . "spectacular advertising" . . . "sales building promotion" . . . "A new idea in merchandising" . . . And now with standard equipment, Auto-Lite is planning even bigger things for 1938.

by Ignition Engineers

MISSISSIPPI . . ."Of course, we feel like mentioning the fact that we believe Auto-Lite is the best spark plug built. Our dealers are enthusiastic about the future possibilities of this splendid line, and your past assistance is especially appreciated."

OHIO . . ."We feel that you would be interested in knowing that since taking on your Auto-Lite Spark Plugs a year ago we have shown a 300% increase in volume over previous year."

CALIFORNIA . . ."Today, we are selling just as many or more Auto-Lite Plugs than we formerly sold, with practically no grief or arguments and also with a much increased gross profit margin."

NEW YORK . . ."In Auto-Lite's huge spark plug campaign, Auto-Lite goes farther than merely making the public 'brand conscious.' The story behind Auto-Lite Spark Plugs is one of the most sensational in automotive history, and nothing is being left undone in telling it. We honestly believe that Auto-Lite Spark Plugs are the easiest selling item we have in our entire stock today."

CALIFORNIA . . ."We have learned from our own experience that everything you told us about Auto-Lite Spark Plugs is true. They do make a difference in the car; so much, in fact, that it is becoming increasingly difficult for the boys on the firing line to sell any plugs other than Auto-Lite. The natural result of this is that Auto-Lite is getting the lion's share of our spark plug business."

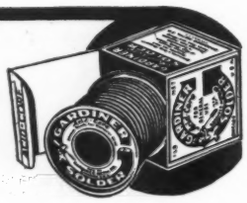
WASHINGTON . . ."The Auto-Lite Spark Plug has already made a name for itself with the trade for its ability to do a better job, no matter how tough the assignment. We have been gratified with the acceptance on the part of both contract and dealer accounts. It has not been necessary for our salesmen to spend time justifying the quality of the merchandise. The general opinion of the entire trade seems to be that since Auto-Lite makes it, it is right."

NORTH CAROLINA . . ."Since we began using Auto-Lite Spark Plugs exclusively we have noted a marked improvement in performance, gasoline consumption, and spark plug life. Needless to say, we are highly pleased with your product and are glad to endorse it."

PENNSYLVANIA . . ."We want to take this opportunity of letting you know that we think you have the greatest spark plug ever put on the market."

THE ELECTRIC AUTO-LITE COMPANY • MERCHANDISING DIVISION • TOLEDO, OHIO

DE SOTO · PLYMOUTH · NASH · AMERICAN BANTAM



ASSURES *Lasting* REPAIRS

• It pays to make important repairs with Gardiner Acid-Core Solder. Its high tensile strength insures lasting bonds . . . makes satisfied customers. What's more, the uniform, quick-acting flux of Gardiner Solder assures faster, cleaner work . . . saves time and material. The Gardiner Line includes Flux-Filled Solders, Solid Wire, Bar and Body Solders . . . also Permanent Lining Babbitt Metal.

Gardiner METAL CO.

4839 S. Campbell Ave., Chicago, Ill.

Chevrolet Clutch

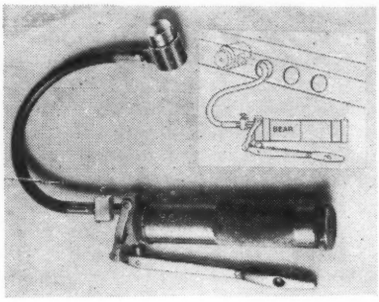
(Continued from page 51)

to maintain the original balance. A specal pilot tool should be used to hold the clutch assembly in position while the clutch to flywheel bolts are being installed and these bolts should be tightened one turn at a time to avoid distortion of the cover. Fill the groove on the inside of the clutch throwout bearing collar with a high melting point grease before installing the throwout fork and bearing.

After the transmission has been reinstalled and the pedals, controls and universal joint reconnected, the pedal clearance should be adjusted to between ¾ in. and 1 in.

Bear Announces New Box Frame Jack

A new hydraulic jack for taking kinks and bends out of box frame sections and flanges has been announced by the Bear Mfg. Co., Rock Island, Ill. Can be used for many



body straightening operations. Dimensions: closed, 1⅝ in. high; diameter, 1⅞ in.; lift, ¾ in.; capacity, 4½ tons.

Repairs Tire Chains

Tire chain repairing is said to be greatly simplified through the use of the Linkmaster, a tire chain repair tool announced by H. K. Porter, Inc., Everett, Mass. The chain links are opened by one jaw and closed by the

other. The long handles make for easy operation, and the tool is designed to operate on all sizes of passenger car, truck and bus chains.

BUELL AIR HORNS

POWER to provide SAFETY CONTROLLABLE for COURTESY

A signal to be proud of. Definitely needed by the highway user who desires SAFETY.

Write for Literature on New WAV-A-WAY Light.

BUELL MANUFACTURING COMPANY
2989 Cottage Grove Chicago, Ill.

1837 1937

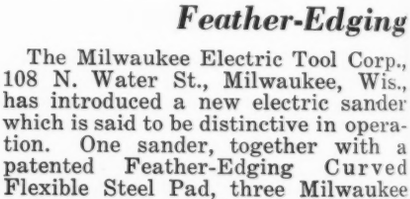
YOU MAKE MONEY SELLING PRAIRIE-SCHOONER TRAILERS

$295 Equipment Extra — Clean sales. No trade-ins. Liberal discounts. Right price range. Write for details. — **$425** and up Fully Equipped

Prairie - Schooner Trailer Co.
Elkhart, Indiana

New Sander Does Feather-Edging

The Milwaukee Electric Tool Corp., 108 N. Water St., Milwaukee, Wis., has introduced a new electric sander which is said to be distinctive in operation. One sander, together with a patented Feather-Edging Curved Flexible Steel Pad, three Milwaukee nested spring steel pads, and two disks of fibre backed abrasives and one double-faced sandpaper disk does all the sanding, including feather-edg-



ing reversed curves, paint removal and grinding that is needed on auto bodies or fenders. It eliminates all filing and scraping on reversed curves in fenders and body. With the special nested spring steel pad, it is possible to use all sizes of disks from 7 in. down. The sandpaper will not clog up as the paint is eliminated through the rippling of the disk.

CLASSIFIED ADVERTISING

INVENTORS—Protect your rights. Before disclosing your invention to anyone send for free blank form "Evidence of Conception" and instructions. Personal attention given all cases. Lancaster, Allwine & Rommel, 415 Bowen Building, Washington, D. C.

Motor Temperature Gauges repaired $1.50. Missing parts replaced. Originators of this service. Factory Methods. Radiator Shutter Thermostats repaired $2.50. United Speedometer Repair Co., Inc., 436 W. 57th St., New York City.

FOR THE OIL GASOLINE & WATER CONNECTIONS
VELLUMOID

VELLUMOID Sheet Packing and Gaskets are always ready for use. They make tight connections you can rely on. Accept no substitutes.
THE VELLUMOID CO., WORCESTER, MASS.

Be sure it's a

Genuine

PUROLATOR

RICH VALVES

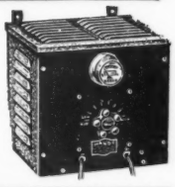
Handy

BATTERY CHARGERS

LOWER OPERATING COST MEANS MORE-PROFIT FOR YOU. No. 6-B Wall type. 6 Battery size. Price, without bulb $24

WRITE for Bulletins on complete line of "HANDY" chargers, testers and racks.

BALDOR ELECTRIC CO.
(Electrical Mfrs. for 17 years)
4375 Duncan Ave., St. Louis, Mo.
GUARANTEED for 2 YEARS



Pin Hole Honing is Cheaper and Better than Reaming

● Never a dull tool or blade-marked hole; small investment; nothing to sharpen; no guess-work or inaccurate fits. Low cost replacement Abrasives; Micrometer Adjustment. Makes ANY mechanic an expert pin fitter. Ask your Jobber today for Standard or Heavy Duty Pin Hone Set you need.

3-TOOL SET $26

HALL PISTON PIN HOLE HONE

Radiator, Battery Repairing and all sorts of soldering jobs easily done with

TORIT

ACETYLENE TORCH No. 23

Simply connect to Presto tank. Price, including a set of 4 tips, $6.75. *Order from your jobber.*

TORIT MFG. CO.
290 WALNUT ST., ST. PAUL, MINN.

Low-down on Overhead

(Continued from page 50)

truck tires—but that made no difference. I got them from the city and had them installed by noon the next day. I had to shave prices a bit to get the order, but I cleared $60 on the deal and I guess that took care of me and the overhead.

"Then the idea came to take on a line of good oils and greases," Philips related. "I did not want to bother with gasoline—there's far too many filling stations now—but I did know that there is good money in oil. I bought and installed a hoist in the corner and stocked up on oils and greases. While I'm overhauling a customer's starter or generator I try to sell him an oil change or a grease job at the same time. My helper can handle this while I'm doing the other job—and we both make money. The customer gets two jobs done at once—saving him time—we get an extra job with hardly any increase in overhead, and it keeps the helpers from getting into the bad habit of loafing."

Young Philips is unlike many shop operators in that he realizes his present limitations. He admits to them quite frankly and is trying to overcome them in the most practical manner.

"One thing I need, and need badly," he says, "is a good advertising plan. I've been thinking it over for some time but so far I haven't come across anything that seems to fit in with local conditions.

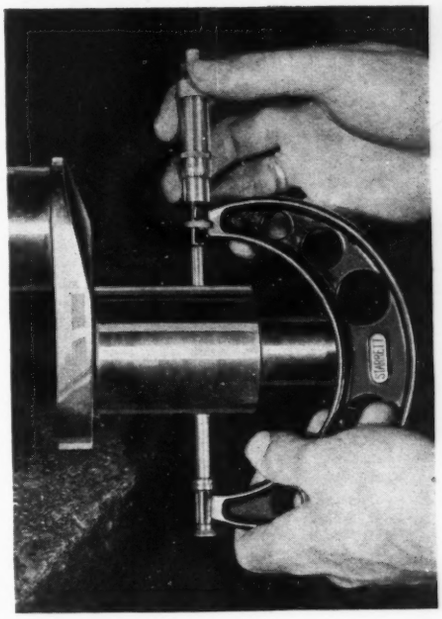
Burd Announces Valve Packing

The Burd Piston Ring Co., Rockford, Ill., has announced a new improved Burd-Lindbloom valve packing to correct valve stem wear and control oil consumption. As illustrated, it consists of a self-lubricating packing surrounded by a pressed steel jacket and a soft tension spring to keep the packing and jacket in place. It is located at the top of the guide, and is installed by simply countersinking the guide at the top with an ordinary drill and then slipping the spring and the complete steel-jacketed packing on the valve stem. The spring is self-entering and self-aligning.

Lamp Catalog Prepared by Yankee Corp.

The Yankee Metal Products Corp., Norwalk, Conn., has recently issued a new catalog covering their complete line of lamps and reflectors.

At the A.S.I. Show in Chicago they exhibited new models of clearance lamps for trucks and buses, new reflectors, reflector lenses and a new model fog lamp. They also have a new line of rear-view mirrors in both the hinge and clamp-on types.



A STARRETT "Mike" for Service Shops

From the standpoint of all 'round utility and economy, Starrett Micrometer No. 224 AA is mighty hard to beat. It's a Starrett Mike which means that its accuracy and dependability are beyond question. Its wide range—from 0—4 inches—is made possible by interchangeable anvils. No. 224 AA does the work of four ordinary micrometers yet it costs only a little more than you expect to pay for one. See it at your regular tool dealer's or write for Starrett Automotive Tools Booklet G which illustrates this and many other tools for auto servicing and tells how to use them profitably. Free on request.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
Dial Indicators for Every Requirement

ATHOL, MASS., U. S. A.

Use Starrett Tools

Tired of discs that wear out in no time? Try these Carborundum-made sanding discs. They're famous for standing up longer. They're tough and rugged. Bear down on 'em and they'll stand the gaff. That's because they're coated with Aloxite Brand Aluminum Oxide, a manufactured abrasive that's uniformly graded and uniformly hard and sharp. Try Carborundum-made Combination Fibre Back Sanding Discs once and you'll stick to them; the regular full grain coating for heavy duty metal sanding; the light coated "K-5" for paint removal and metal clean-up. They're fast cutting and long lasting. Remember to ask for them by name.

Tune in the Carborundum Band, Saturdays at 7:30 P. M., E. S. T. Columbia Chain.

THE CARBORUNDUM COMPANY
REG. U. S. PAT. OFF.
Niagara Falls, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

Carborundum and Aloxite are registered trade-marks of The Carborundum Company

CARBORUNDUM
REG. U.S. BRAND PAT. OFF.
ABRASIVE PRODUCTS

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